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AUDUBON MAGAZINE

A BI-MONTHLY MAGAZINE DEVOTED TO THE PROTECTION AND PRESERVATION OF OUR NATIVE WILDLIFE

Our Motto: A Bird in the Bush Is Worth Two in the Hand

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SUMMER ON TH

A picture of the marsh country when the geese are gone

By Don Eckelberry

with illustrations by the author

IT is evening now and very quiet except for the gurgling of a few boat-tailed grackles on top the Roseau Cane, fidgeting and stretching their necks as though they all wore collars a size too small.

Every day I sit here on the screened porch and look out over Belle Isle Lake to see the deer feeding along the margins, and watch the evening colors ignite, flame and die to a gray ash. But today was something special—my birthday—and surely the nicest of them.

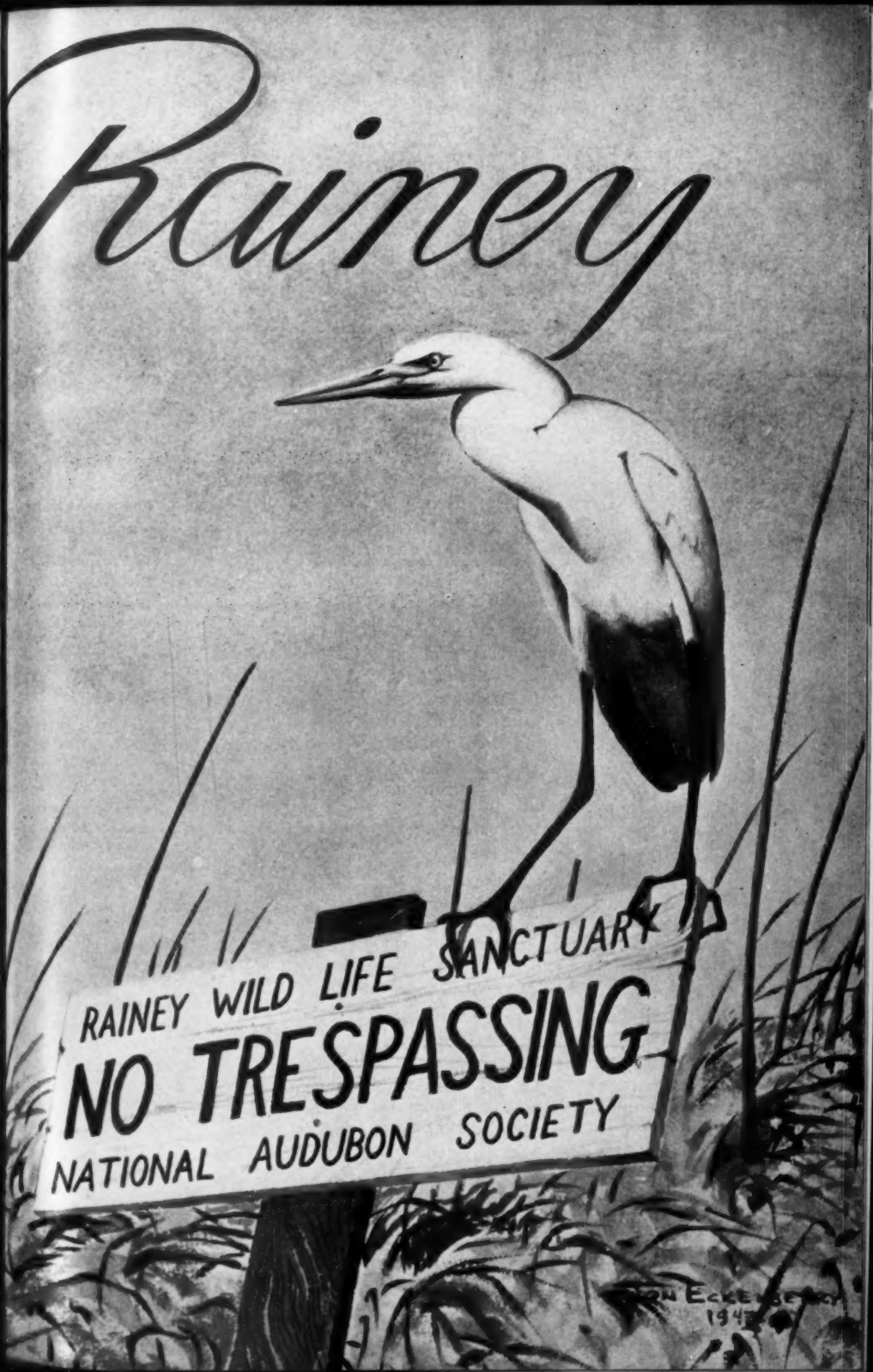
Awakening as usual to the cascade of orchard oriole song everywhere in the marsh and to warden Dewey's less accomplished efforts in the boathouse, I dressed (a negligible task down here) and went over to Dewey's camp for coffee. Perhaps the most typical feature of a cajun's camp is the little gray enameled tin coffee-pot set in a kettle on the kerosene stove, always ready to pour out a black fluid which certainly makes "dishwater" an applicable term for what we drink back in Ohio.

Today we were to go to Deadman's Island to see that all's well with the bird colony. Our departure is often hasty but it was never executed with such firemanlike efficiency as this morning. I knew the mosquitoes would be bad for I could hardly see through the window screens last night; and they droned me to sleep. As I untied fore and aft, Dewey started the motor. My blue jeans were solid brown below the knees with mosquitoes. I jumped into the boat, grabbed the flit gun and pumped out a small-sized cloud. Dewey eased the "Blue Goose" into the green water of the bayou. Her 135 h.p. Chriscraft motor throbbed quietly. We turned east into the lake and the rising sun.

These 26,000 acres which comprise the Paul J. Rainey Wildlife Sanctuary are but a minute spot on the broad green belt of Gulf coast marshes. This is a horizontal world stretching endlessly around you – a maze of bayous, canals, pirogue trails, lakes, ponds and bays. And after you live here awhile you're not sure there are such things as dry land, mountains and deserts. The whole world might be like this on and on until you come to the edge. But for all the immensity of such a wilderness—and it *is* wilderness still—it is a friendly place, a cheerful wilderness.

While summer might be called the "off season" for bird life (if compared to the thrilling sight in winter of thousands of blue geese sweeping the sky or of ducks everywhere), the marsh is by no means empty. Moving along the bayous green herons, grackles, orioles, eastern kingbirds, Louisiana marsh wrens, yellow-throats, least bit-

American Egret—painting used by permission of Mrs. F. B. Crowninshield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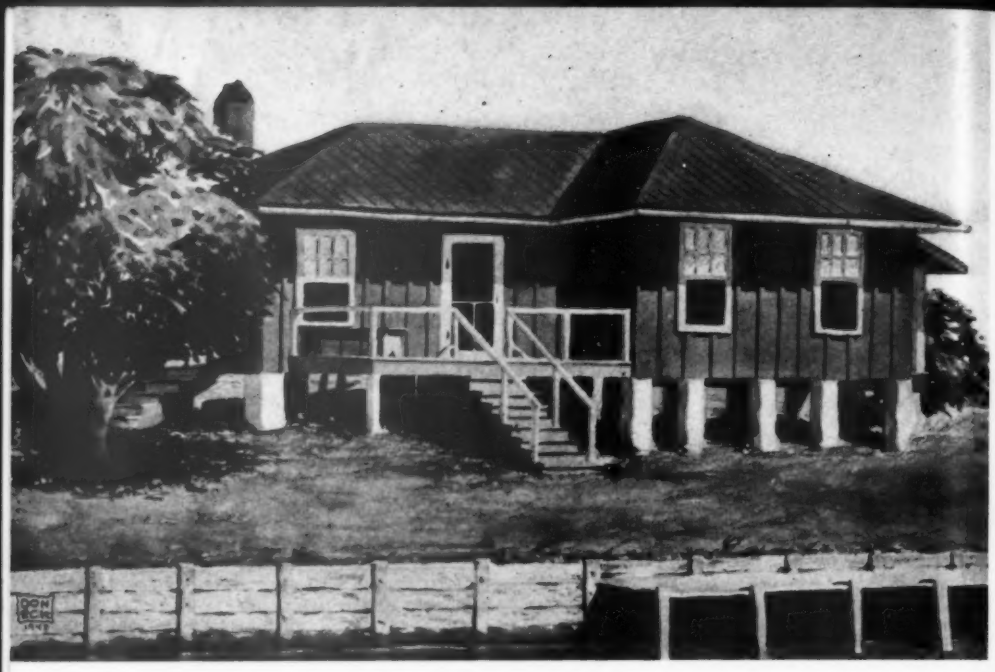


On a man-made island of shells with Belle Isle Lake on one side and the main canal on the other, are the two wardens' houses, boathouse and feedhouse. This is the roomy chief warden's residence where visitors stay. The tree with the woodpile stacked against it is a chinaberry.

terns, red-wings and purple gallinules constantly get up ahead of the boat.

As we entered sprawling shallow reef-strewn Vermilion Bay, Forster's terns left the channel stakes reluctantly and laughing gulls met us to see if we were trawling. It was dead calm for once, and we made good speed over the slick water, our wake foaming white, dividing and dropping rapidly behind us in widening rhythmic lines.

A small straggling flock of glossy ibis flew over the marsh, then another —perhaps forty birds. A few minutes later sixteen mottled ducks, the only breeding waterfowl on the sanctuary, flew across the bow. Royal terns looked immaculate against intense blue sky. There were already a few black terns in early July.

In a little more than an hour, we were at Southwest Pass. I had wanted to stop on the west end of Marsh Island and today there were many birds on the beach, so Dewey brought up the launch as near as he could,

The Rainey is patrolled in three boats: ***The Chick***, with its 17 h.p. Redwing motor; ***Whistler***, powered by a 75 h.p. Chriscraft; and our big launch ***Blue Goose***, pictured here. The boat has just passed the last channel stake en route to Deadman's Island at the mouth of Southwest Pass; beyond is the Gulf.

and I, in swimming trunks with binoculars and moccasins over my head, waded gingerly over barnacles and oyster-shells to the beach. I was amazed to see a white pelican in a little cove. Apparently no less surprised to see me he nearly fell flat on his face trying to take off. There were large numbers of Forster's and royal terns and a few gull-billed terns in a compact flock down beach. The next cove I approached with more caution and was rewarded by getting very near a flock of black skimmers all characteristically facing the same direction, standing on their amputated legs, their lower jaws jutting out—and looking altogether as ungainly on land as they are graceful in the air.

On the beach Wilson's plovers ran about herding their well-grown young ahead of them excitedly and seeming not to know quite what to do about it. The sanderlings wouldn't have been visible at all but for the dark puddles of shadow under them.

Nighthawks were numerous. Each selected a piece of shade under the driftwood scattered along the shore. They would fly up, batlike, practically underfoot calling *dzeeb! dzeeb!* The parent birds, once a youngster had flushed, would dive at it alternately, checking their plunge just over its head and in so doing made that odd noise which bird books describe as boom! but sounds nothing like that to me. At any rate, between the two of them, they bully the poor youngster into going just where they want it.

I was in the process of trying to get a good look at a seaside sparrow when a flock of willets, turnstones and black-bellied plover flew past along the beach. On the way back to the launch, a clapper rail dashed into the grass and some little blue and yellow-crowned night herons flew over.

By this time I was rather hot and the manufactured breeze of the moving boat felt wonderful. The pale green water twinkled. Porpoises rolled and occasionally a shark fin cut the surface. The brown pelicans always gave me special satisfaction — their "diving form" was no better than my own. I am almost tempted to say *worse!*

Of course we had been seeing herons all morning but as we idled up to Deadman's Island—a tiny key in the Pass—the snowy covering over the vegetation rose up like so many pieces of white paper blown by the wind. Two species colonize here: Louisiana heron and snowy egret in ratio of about four to six. With around 650 nests, a good season with

Marsh men do not speak of good and bad weather—weather *is* bad weather. So this picture was titled ***Weather on Vermilion Bay***. Mottled ducks are hurrying across the water and a few royal terns fly in the distance.

only normal nesting mortality, we figure this year's crop conservatively at about 2000 young. We found eggs and young in all stages. As the birds returned to the nest, they did a good deal of displaying. I doubt if there is anything in the bird world more breath-taking than a snowy egret with crest and nuptial plumes all erect, waving in the sun. I've seen it over and over again and each time there is that wild elegance which will not become commonplace.

Last week I had painted snowies flying against this green-blue sky. I noticed the shadows, which were about the same value as the sky, had a pinkish cast to them. However, adding pink to the gray didn't work at all. It looked painted. So I mixed my sky color as exactly as possible and then laid the shadows in with neutral gray—and sure enough, there was the pinkish illusion. Shadows tend to be complementary in color, which for green-blue would be red-orange grayed in intensity to pink.

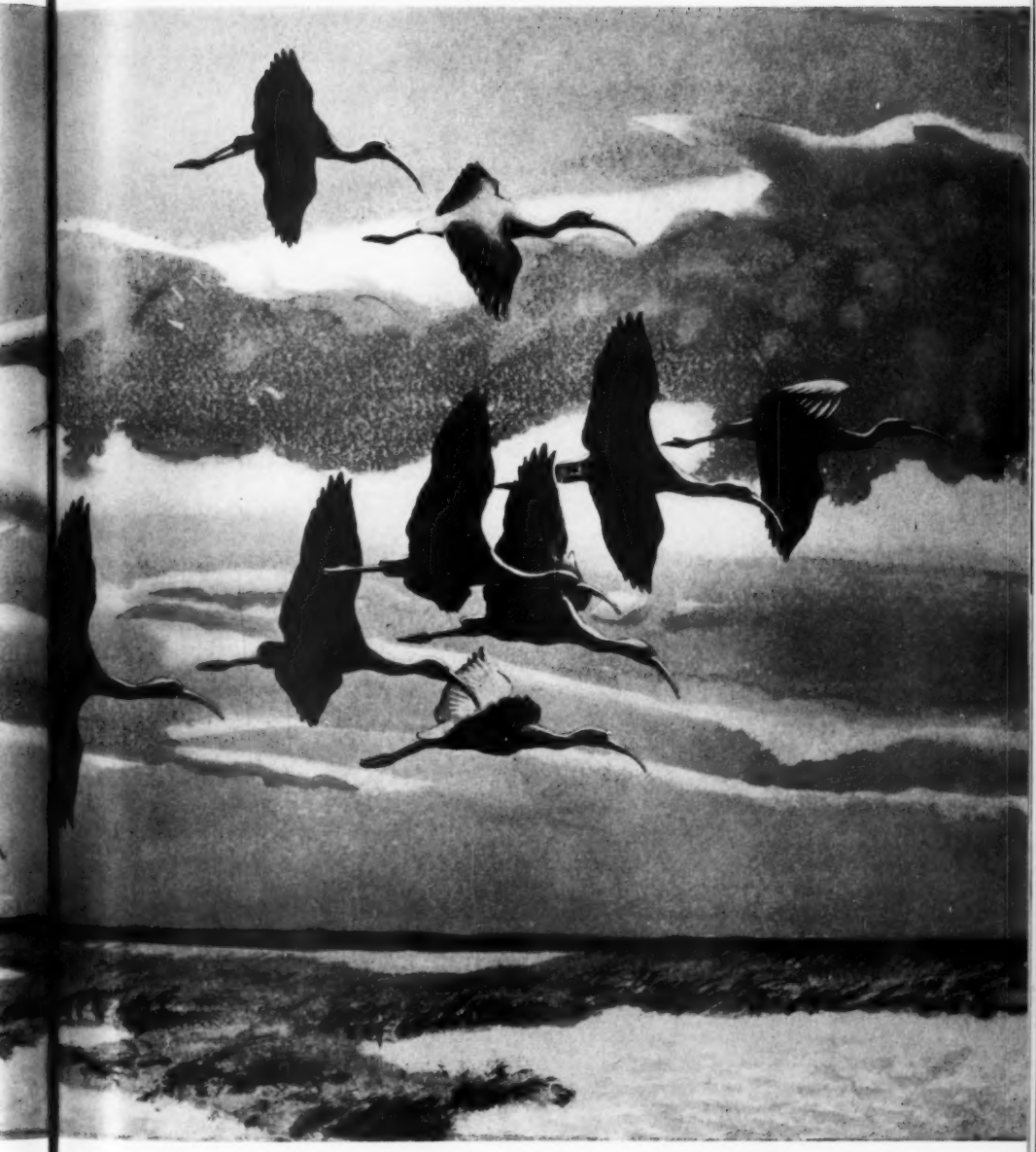
Today I sketched an egret on the nest just a few yards away in the bright sunshine. Working in the shade of the cabin to keep the glare off the paper, I laid in detail by using a pencil in one hand and binoculars in the other.

On the way home we passed close to man-o'-war birds in all plumages perched on the channel stakes. The immatures are most handsome with their immaculate white head and breast! Even the bill is white.

I shall never "grow up" to the point where I believe there are more important occupations for man than lying on his back and looking into the sky. Such a position is by no means essential but it is undoubtedly the most satisfying. I had a letter from two boys in Ohio whom I'd grown quite fond of after a summer's bird-

Courtesy Mrs. Paul Moore

It has never been determined whether the glossy ibises which occur so regularly are eastern or white-faced. Although the author tried repeatedly to determine this, he was



never able to be sure. At no time was white on the face visible, yet the white-faced species would seem more probable and young birds would not show this characteristic. Perhaps both occur. Like American egret, Ward's heron and white ibis, the glossy ibis does not nest here for lack of trees. This watercolor shows a small flock over the salt grass ponds.

ing together. They wrote: "Whenever we look at the sky we think of you for we know you are watching it, too." That was the greatest compliment I had ever received. Up in the blue void today sailed gulls and terns on silver wings, and my spirit sailed with them—and I was all spirit.

Swimming is next best to flying. There is always a feeling of release in a change of element. The "Blue Goose" lolled on the sun-soaked water, reflections scintillating across her white hull. Even at so short a distance she looked small and unimportant, but not an intruder in this world of seven-eighths sky and one-eighth water, all fresh and high-keyed like some of Winslow Homer's tropical water colors.

But we had dinner to catch! Dewey got the trawl ready and I sat at the wheel as he played out the net and finally the heavy wooden fins which kept the mouth of the net open and below surface. We thrummed along at slow speed for half an hour and then pulled the net in. Dumping everything in the wash-tub, we began lifting bunches of shrimps out by their antennae and putting them in a bucket. We kept three or four gallons. The small fry were thrown to the impatient circling birds.

Lionel Le Blanc, old-timer in the marsh, whose endless stories need only to be bound to make a great book, taught me to eat shrimps raw. They're rather hard to peel, being of a jellyish consistency, but really have a good sweet taste, a flavor entirely lost in cooking.

Snowy egrets protect their eggs and semi-naked young from the intense glare of the sun by crouching over the nest with wings drooping rather than sitting. This allows the air to circulate in the shade under her body, keeps the young warm but does not suffocate them.

The island was bustling with activity—parents regurgitating food to young, tired mothers changing positions on nests, males fighting or flying about, and well-grown young climbing through the brush.

The cover painting (snowy egrets) on this issue was painted during the author's three month residence on the sanctuary. The opening picture of an American egret perching on a sanctuary sign, shows a common species which, however, does not breed on the area for lack of trees.

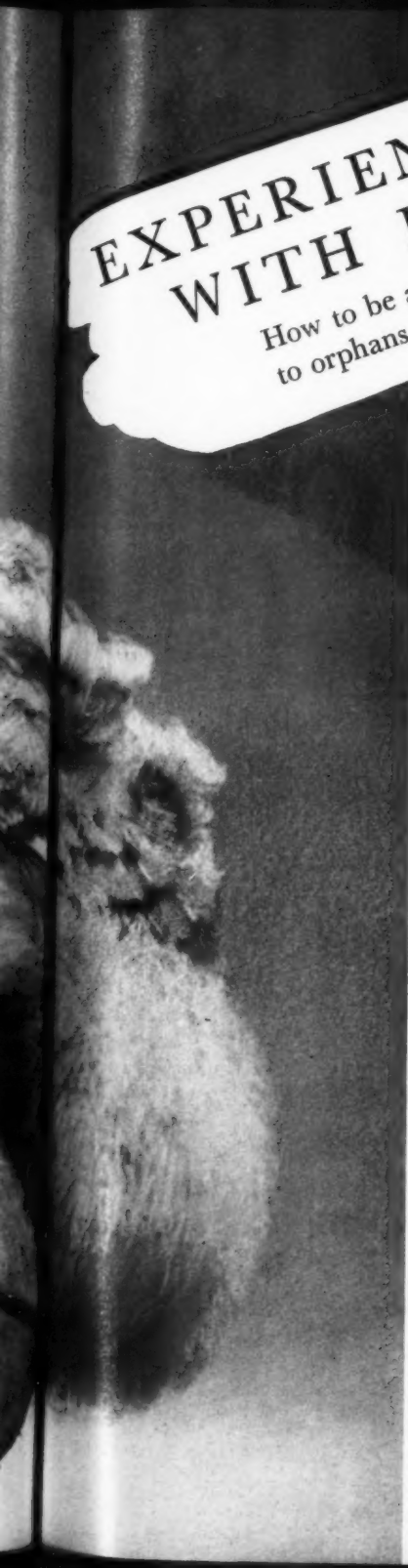
The picture below titled ***Southwest from Hell Hole*** gives some idea of the flat vast marsh. The distant trees are near Chenier-au-tigre, the little French settlement on the coast. These great cumulus clouds are also typical of the summer sky on the Rainey and the "spot" rainstorms which can be seen somewhere around at almost any time. Hell Hole is about six miles due south of Redfish Point Light, just visible in the painting of Vermilion Bay.

Having saved some small shrimps for bait, we dropped anchor over an oyster reef and in about twenty minutes had fourteen nice speckled trout (*Cynoscion nebulosus*), small drum and croakers. A three-pound trout bent my pole to the water. I almost lost him before he played out.

And so if you have ever eaten shrimp court-bouillon, you know that as I sit here on the porch waiting for the southern moon to rise out of our marsh-rimmed lake, I do so with more than ethereal satisfaction alone.

And I am thinking, as our barn owls make their first sorties into the night, that by the time you read this my summer on the Rainey will be gone, thousands of ducks and geese will have had another winter of sanctuary from all harm, will have returned to raise another family in the North, and these—these—unspeakable mosquitoes will reign supreme again!

Young Horned Owl by John S. Taylor



EXPERIENCE WITH FLEDGLINGS

How to be a successful foster-parent to orphans of the bird world—

By Sara Menaboni

IN open-forum formality, the third-grade boy asked me: "What shall we do about the starling menace?"

Menace—what a word for the vocabulary of so small a child!

There had been a time when I had been prejudiced against starlings, too; so prejudiced that the sight of a young starling, huddled in fright against a brick wall at the side of a city street, had failed to move me. Starlings were taking over the country, starlings destroyed other birds' nests, starlings were generally a hated nuisance, so let this one perish—one less starling to be a menace!

As I walked on, I thought that if my husband, Athos, had been at my side, he would have wanted to save the life of the unpopular city waif. Athos had something that I lacked: an embracing love for all Nature. To attain the utmost in bird consideration, I, too, would have to feel sympathetic with all species. I retraced my steps, gathered the helpless starling into protective hands and, as I went home with my foundling, I realized that I had overcome my prejudice against starlings.

In the days that followed, the foundling won my heart. Even his mischief-making delighted me, as when he would poke his closed bill deep into the dirt of a potted plant, then open his mandibles and scatter the dirt far and wide. When I was pre-

paring meals, he would make a nuisance of himself, trying to get into all the food. Or if I made him stay on my shoulder, he would peck my ear until I fed the spoiled brat. Noisily and exuberantly, he romped through our rooms, causing confusion and chaos, but how could we be cross with him? After some particular bit of mischief, he would come to my shoulder and snuggle affectionately against my neck, until all was forgiven.

It was a sad day when we decided that our bird was old enough to be turned loose in the big world. The time had come for him to be in the company of other starlings, to live according to his destiny. In the meantime, he had converted me to the cause of starlings, for there is nothing that will so quickly establish sympathy and understanding between birds and human beings as a foster-parent relationship. I hope that the third-grade boy, and all children, will have the experience of raising a helpless fledgling, for it is a character-building opportunity for a human being and saves the life of the bird orphan as well.

I cannot stress too strongly that only orphan fledglings be adopted, for well-meaning persons are sometimes too hasty about adopting foundlings. Often fledglings, for some unknown reason, leave the nest prematurely, yet are successfully cared for by their parents, if there are no cats or dogs around. Should there be the slightest hope that the young ones will receive attention from their parents, they should be left to their care.

I remember with pleasure the day Athos appeared at the door with a young yellow-billed cuckoo perched on his finger. We had known that a pair of cuckoos were in our thicket and had suspected that they were nesting, but we never knew what happened to them or the rest of their offspring. Athos found this lone fledgling on a limb, plaintively croaking for food.

He was fairly large and we did not doubt our ability to take over where his parents had left off. We captured live insects and grubs and, with tweezers, poked the food down his throat. Yet the next minute he croaked with hunger as before! How were we to even half-satisfy his voracious appetite? We solved our problem by catching and bottling the insects that were attracted to our windows by the electric light at night. Throughout the following day, whenever the cuckoo was hungry, we had a plentiful supply of insects awaiting him. I called this bird our "bottle-fed baby."

It is important to have knowledge of what to feed a particular bird. Regardless of whether the bird is a sparrow, a duckling or a hawk, the first impulse of many persons is to place bread before the unfortunate bird. Once a man brought us a Florida screech owl and he wondered why it would not eat the graham crackers in the box! A woman telephoned that she had found a horned grebe and, since it would not eat the bread she gave it, would we relieve her of the strange bird? Upon securing a fledgling, bird books should be consulted, to learn what the scientists have found to be the natural foods of that species, then proceed to feed the fledgling those foods, or the nearest possible substitute.

Many prepared foods can be purchased for young quail, turkeys and mallards. To these we add lettuce for all three; ripe tomatoes for bob-whites, and grass cuttings for wild turkeys. There is a prepared food called "Mockingbird Mixture" which we have used successfully on both mockingbirds and hooded warblers.

Hugh M. Halliday

These five and six day old yellow-billed cuckoos look like porcupines today, but tomorrow those long sheaths will split and full plumage will blossom forth. Except for a short tail they will resemble their parents.

But common sense, plus a dash of ingenuity, are free and bring good results.

To know about the digestive processes of a species is a help. Take the great horned owl twins that came to us, for instance. We knew that owls eject matted pellets of indigestible matter, namely bones, fur or feathers. So when we fed these birds raw meat, in lieu of mice and rats when we did not have them, we mixed chicken feathers with the meat. We have followed this practice with all our fledgling hawks and owls, when the supply of trapped mice and rats was insufficient.

We have worked out a basic food formula that has been satisfactory for starlings, blue jays, cardinals and towhees. This consists of hard-boiled egg, mostly yolk, mashed thoroughly with a few drops of cod-liver oil or olive oil, and enough warm water to make a soft, but not watery, consistency. For variety, we add one of the following: grated raw carrot, scraped apple, chopped lettuce, corn-meal, oat-meal, grated nuts or finely chopped raw meat. Jays like prepared duck food, too.

Robins and mockingbirds thrive on the basic formula, plus raw meat, grated nuts, prepared "Mockingbird Mixture" and as many earthworms and insects as can be secured. Crows like the basic formula with variations, especially raw meat and green corn cut off the cob. When birds are old enough for solid food, sand is added for the smaller birds and gravel for the larger

A. L. Shelton

The wide-ranging robin-sized sparrow hawk might easily be included in a list of our most beautiful birds. More than just handsome in gray-blue and rust red, this littlest falcon is a real farmer's ally feeding largely on grasshoppers and mice.

ones—about six to ten pieces with each feeding.

Our boat-tailed grackle received a diet of chopped raw meat or fish, mixed with corn-meal, uncooked shrimp (which fortunately I could buy frozen and thaw when needed), and all the crayfish we could catch in our brook. The latter took quite some doing, but that is another story!

If the fledgling is quite old, in captivity it may not eat at first, and we have to resort to force-feeding. Our method is to hold the left hand over the bird's back and closed wings, and with forefinger and thumb, to gently but firmly pry open the bill at the base and hold it open. The right hand holds a small paint brush with the food picked up on the soft bristles. (A smooth stick, without sharp point, is a device that is satisfactory also.) As the food is poked down the throat, not too much at a time is given or else the bird will choke. More is given until the crop is full; especially at nighttime the bird must be satiated before going to sleep. An insect-eating bird is fed with tweezers, thrusting the insect or grub well down the throat. In a short time, the bird learns to willingly open its bill for food.

Doves and pigeons present a different problem, since these birds stick their bills inside the throats of their parents to pump up the predigested food. Such birds must continue to be force-fed, even though they have become tame and eager to cooperate, for it is their nature to eat in this fashion until old enough to pick up grain of their own accord. They are difficult to feed and require unlimited patience. We have given our doves and pigeons corn-meal mixed with boiled mashed egg and water or milk, quite liquid. Later, when the birds were full-feathered and old enough for whole grain, gravel was added. For doves, the gravel was the size of the small letter "o" as printed on this page, and for pigeons, the size of the capital letter "O." To get the food down their throats is something to "write home about!" Our most successful improvisation was

to cut a hole in a rubber ear syringe, putting the semi-liquid food in it, and then squeezing it out of the enlarged spout, far down into the throat. Of course, the ear syringe was ruined for any further human use!

Casting aside all dignity, we made noises during feeding time, in imitation of the parent bird. Loud kissing sounds seem to do as well. The fledgling soon associates the sounds with food and opens its bill eagerly.

In order to give fledglings a drink, we dip a soft small paint brush in water and place this in the throat. To squeeze water from a medicine dropper or from a piece of soaked cotton is equally effective. Young birds do not need much water. As the bird becomes stronger, we dip its bill into a water cup until it learns to drink by itself. For months, one obstinate jay refused to drink out of anything except a table glass. Owls and hawks receive enough liquid from meat and require no water.

The less a bird is handled, the more content it will be. I always think how panicky I would be if gargantuan hands should try to clutch me! Even among the tamest of pets, I have yet to see a bird that did not object to hands actually closing around it in a grip. Soon enough, birds become very trusting and willingly perch on a finger or arm.

Proper housing is an important factor in bringing up fledglings. If quite

Intelligent and pranky, young crows are a constant source of amusement. Some people still split crows' tongues in the belief that it will "make them talk."

S. and A. Menaboni

young, the bird should be placed in a box or basket, with a simulated nest formed of soft cloth. Should the fledgling be old enough to perch, it is placed in a cage or, better still, given the freedom of the room in which it can learn to fly. Cleanliness, of course, is imperative. At all times, the baby bird should be kept warm and at night covered with a cloth, and protected from drafts. When old enough, bathing facilities should be provided; and in the case of gallinaceous birds, a box of dry powdered dirt for dust bathing.

A bird must have sunshine, too, but should be shaded from the heat of the mid-day sun. I learned from a crow that birds want a cool retreat in hot weather. Our crow was in the shade on a screened porch and was given cool water, yet miserably he panted. I transferred him to the coolest room in the house and, from that time on, during the summer days, the crow spent hours on the shower-bath rod in the bathroom.

When birds get old enough to assert themselves, we give them the privilege of making their own decisions. One of our jays, after graduating from a basket, had a hard time finding a place to sleep that suited him. One evening, we found him on the shower-bath rod. He had difficulty in keeping his grip on the slippery metal, so Athos tied a piece of felt on the rod. Every night, after that, the jay went to his "roost." If the bathroom door was closed, we soon heard about it for the bird set up a terrific chatter. Months after he was released and free to roost where he pleased out-of-doors, this jay returned to the house to sleep. Truly, a creature of habit!

In bringing up baby wild turkeys and ducklings in confinement, we make a great point of outdoor exercise and play-time. The little turkeys frolic on the lawn, chase each other and jump into the air gleefully. They even strut—quite a sight to behold in two or three week old turkeys! The ducklings are taken to the brook to swim, dive and blow bubbles, or slide down slippery rocks, to get caught in little waterfalls and tumble below, or to scramble up the banks when they have had enough. For hours on end, our trained Irish setter "nurses" the turkeys and ducklings, carefully watching over them.

Companionship between bird and foster-parent can be very touching. Our sparrow hawk seemed devoted to Athos and played a game with him. Upon seeing Athos, the bird pretended to strike, landed on Athos' head, clutched a lock of hair and all the while uttering his play call. At other times, the hawk would perch on Athos' shoulder and nip at his earlobe. Those talons and bill could have pierced the flesh, but no, the little falcon was gentle with his man-playmate.

Every bird, upon reaching adulthood and when fully able to fend for itself, should be released. We always adhere to this principle, but even after the birds are released, they linger with us for a time, responding to our calls when we are out of doors. Last summer our male cardinal stayed close by, even after he had mated with a wild bird and had a family of his own. To go outside, whistle a certain tune, and have a red bird swoop down on us from nowhere to eat sunflower seeds from an outstretched hand, never failed to give us a thrill.

Another nesting season is at hand. What birds will it bring us? This is always an exciting speculation in our household. If we had our choice, we would ask for a sparrow hawk, a blue jay or a starling. But like all expectant parents, we accept what we get and are entirely happy about it!

BIRDS OF HAWAII NATIONAL PARK

By Paul H. Baldwin

WHEN Congress acted on August 1, 1916 to preserve in unimpaired beauty the volcanoes of Kilauea, Mauna Loa, and Haleakala in a reservation to be known as Hawaii National Park, it established, too, a sanctuary for rare and beautiful Hawaiian birds.

The wonder of Hawaiian bird life arises from the great isolation of this archipelago, which is more distant from major land masses than any other group of islands in the world. Perching birds crossed the thousands of watery miles to become established ages ago, and today the numerous descendants have diverged to form a distinct family of sickle-billed nectar and insect eaters and heavy-billed fruit and seed eaters. Little evidence remains as to the identity of their continental ancestors. Before the primeval assemblage was completed, rails, hawks, owls, herons, geese, ducks and several additional stocks of perching birds strayed here to take up forced residence: a varied lot for such a distant place.

These birds have long since been described, though little has been written about their ways of living. Now, in many places the birds have disap-

PRONUNCIATIONS

The pronunciations given are from "A Dictionary of the Hawaiian language," by L. Andrews and (revised by) H. H. Parker (Honolulu, 1922).

A summary of diacritical marks and vowels follows:

Macron (¯): marks long or normal vowels.

Breve (˘): indicates short sounds.

Glottal closure (ʻ): "indicates an interruption of a sound that prevents two vowels from coalescing . . ."

ā=a in father
a̍=a in liable
ē=a in mate
e̍=e in net
ī=i in police
i̍=i in hill
ō=o in old
o̍=o in old but not so prolonged
ū=oo in moon
u̍=approximates sound of u in full

peared and with them opportunity for study. However, in Hawaii National Park on the Island of Hawaii many of these birds, ancient and modern, are still living in large numbers.

In the summer of 1937, two student technicians in the Civilian Conservation Corps endeavored to determine what birds were present in the park. In the following two summers I made surveys of the forest environment and also of bird parasites and diseases. In 1940, I resumed census and life history work which was finally interrupted by the war in 1941.

As a result of this work eighteen native birds are known in the park. The larger land birds are the *nene* (nēʻ-nēʻ), Hawaiian goose; the *io* (īʻ-o), Hawaiian hawk; and the *pueo* (pūʻ-ēʻ-o), Hawaiian owl. Several shore birds visit the park, such as the *akekeke* (a-kēʻ-kēʻ-ke), or ruddy turnstone; the *kolea* (kōʻ-lēʻ-a), or Pacific golden plover; and the *ulili* (u-liʻ-li), or wandering tattler. Even sea fowl, such as the *koae* (kōʻ-aʻe), or white-tailed tropic bird; the *noio* (nōʻ-īʻ-o), Hawaiian tern; and an occasional *iwa* (īʻ-wă), or frigate bird, are known to the area. The following seven members of the Hawaiian nectar-eating family are found here. The *iiwi* (ĭ-īʻ-wĭ) and *apapane* (ā'-pă-pă'-nĕ) are both red birds with black wings and tails. The *amakihi* (ă-mă-kĭʻ-hĭ), olive-green creeper (Hawaiian name uncertain), *akiapolaau* (probably ā-kĭʻ-ā-po-lāʻ-ăʻu), and *ou* (oʻu) are predominantly green. The *akepa* (ā-keʻ-pa) has a green female but an orange male. The *elepaio* (ĕ-lĕ-păʻi-ŏ), a flycatcher from the South Pacific, and the *amao* (o-maʻo), a thrush from the Americas, complete the list.

How will you recognize the forest birds when you meet them along the trails? The *elepaio* can hardly be mistaken because it is the only bird here of brown, rust color, black, and white. It has an onomatopoetic "*elepaio*" whistle and shows a familiarity and curiosity that contribute much to the pleasure of bird stalking in Hawaiian forests. One actually started to alight on the wide rim of my hat but reconsidered when within a few inches of it. The *iiwi* and *apapane* can be confused, though the *iiwi* has a red, sickle-shaped bill and the *apapane* a black, straight bill. Among the green birds the *ou* has a thick, short bill for eating fruit, while the *akiapolaau* has a combination bill: with its short, stout lower bill this woodpecker-like bird hacks away the bark of the tree; then with its long, curved upper bill it hooks out the insects. The *amakihi* and olive-green creeper may be a real problem to tell apart, though the former hunts insects among foliage while the latter hunts them on tree trunks and branches.

Sometimes my wife, Sarah, and I tell visiting friends about taking census counts, and they are curious to see how we do it. Not long ago we took a young navy couple on a count in the *koa* (kōʻa) groves on the slopes of Mauna Loa. We followed succes-

sively three parallel trails two hundred yards long and eighty yards apart counting birds by sight and sound on a strip wide enough to cover a total of five acres. In thirty minutes of actual counting time we listed nine *amakihi,* eight *apapane,* four *iiwi,* one *akiapolaau,* three *elepaio* and a few each of several introduced birds. This simple procedure did not tell how many birds in number or kind there are in Hawaii National Park, for different bird communities are found in other types of forest as well as in shrub, grassland and desert areas which exist in the park. To obtain a fair picture of the bird life, we have counted five-acre areas elsewhere and have repeated counts several times a month.

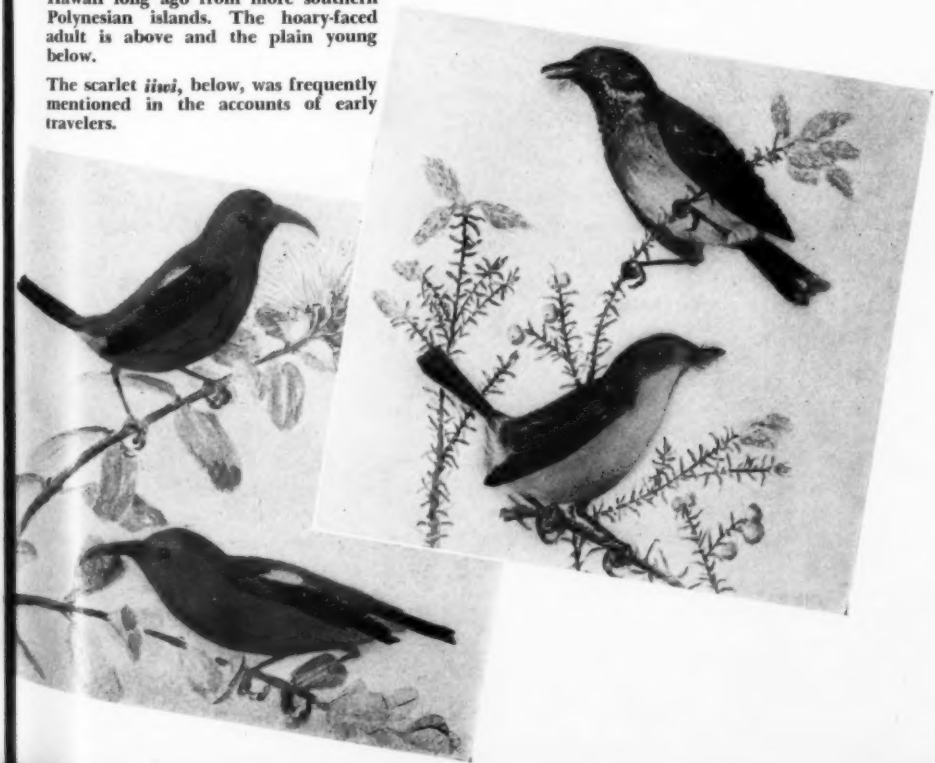
The Manuiki Audubon Society of Hilo covers ten miles of trails within the national park forests when making the annual Christmas Counts. These counts show that native birds form the major portion of the park's bird population and that this population remained at a stable level from 1937 through 1940.

Several movements have been discerned in about two years of our counts. The *iiwi* move into the wet fern forest east of Kilauea crater in August and remain there only until March. The *apapane,* however, stay there all the year round and breed there. Where the group of *iiwi* from this region goes in spring to build their nests is yet unknown. In the fall months some *apapane* accompanied by *amakihi,* but not by *iiwi,* are found to go down into the lower *ohia lehua* (o-hi'a lē'-hū'a) forest and in spring to leave again for the higher forests. The *elepaio* and *omao* have remained wherever found all year. Evidently the honey-eating birds are more footloose.

More spectacular movements are the irruptions of *apapane* and *iiwi.* Sarah

The familiar *elepaio,* right, is descended from a flycatcher that came to Hawaii long ago from more southern Polynesian islands. The hoary-faced adult is above and the plain young below.

The scarlet *iiwi,* below, was frequently mentioned in the accounts of early travelers.



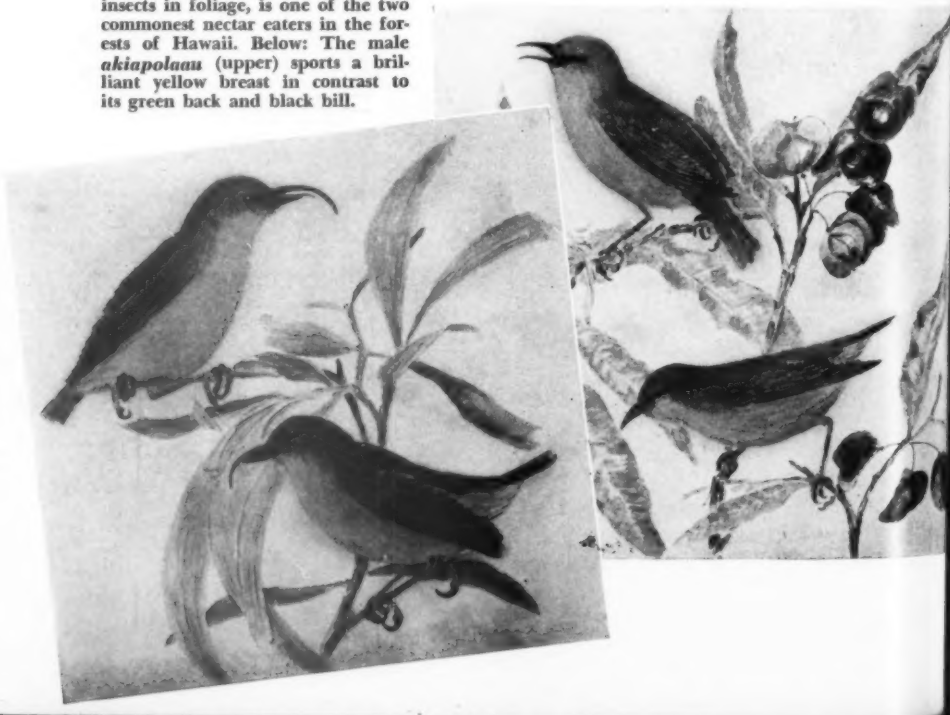
and I saw one in May of 1942, while passing through Kipuka Ki on our way down from a night at the Mauna Loa lava fountains. The *ohia lehua* trees, grand big ones, were covered profusely with crimson nectar-bearing flowers. The air was a-twitter with thousands of *apapane* and hundreds of *iiwi*. In July, 1937, Walter Donaghho, who now is watching birds in the South Pacific between hours of military duty, saw a similar congregation of several thousand *apapane* in the forest of Kipuka Puaulu a mile or two away.

NESTING

It cannot be said that our predecessors have worked out all the major facts about birds here. Although the birds were intensively collected fifty years ago, the nests of some species are yet to be discovered for the first time: that of the *omao*, for example. The nesting of even the abundant *iiwi* has not been reported on to my knowledge. The park offers an excellent chance to do this; for the *iiwi* nests in the *koa* trees on the slopes of Mauna Loa. I have seen the flat, open-cup nest built of *koa* twigs and lined with yellow-green lichen. I found three eggs in one and two nestlings in another. One egg which I had occasion to transport, I had to take in my mouth, for want of a better place and crushed it accidentally. It was remarkably salty, and the yolk was deep orange. The young *iiwi* in the nest appeared green, except for their tan bills. Not long after leaving the nest the fledglings begin to produce red feathers which show in ever enlarging patches on their bellies and elsewhere. Later the juveniles develop a yellow, black-speckled head and neck before they finally achieve their brilliant, scarlet adult plumage.

The longest nesting period I have observed belongs to the *iiwi*. In 1941 actual nesting had commenced early in January, as newly fledged young were seen in the park forests in the middle of February. The latest new

The familiar *amakihi*, right, seeks insects in foliage, is one of the two commonest nectar eaters in the forests of Hawaii. Below: The male *akiapolaau* (upper) sports a brilliant yellow breast in contrast to its green back and black bill.



fledglings were seen in July. *Apapane* and *amakihi* apparently started a few weeks later in the spring and continued through the early summer.

BIRD VOICES

It was a pleasure to work out the song patterns of the different species. I know that of the *amakihi* best and have some of the notes and phrases associated with sex and actions. The male *amakihi* has a slow, level "trill" which it gives by itself or as a component of a complex song while fighting or singing for territory. The closely related olive-green creeper has a similiar male note given under like conditions, but it is more rapid and descends as does a whinny. I am certain that the *akepa* also has a similar but distinctive male "trill," though I have not been in the haunts of that rare bird enough to work it out fully. The close relationship of these Hawaiian birds is shown by these voice phenomena. Even the *akiapolaau* with its so divergent bill structure has certain complex song elements almost indistinguishable from the three mentioned above, and from what little I have heard of the *ou* voice, I believe its notes may be likewise similar.

On the other hand, the notes of the *apapane* and *iiwi* are totally different from the green group. At least I can discern no similarity at all in the sound of the notes, the types of phrases, or corroboration of voice with behavior. It is as if the red birds belong to a different lineage altogether.

HOMING

The *amakihi* gives us a story to add to those already told about the remarkable homing instincts of birds. On Mauna Loa, nine miles by air line from park headquarters, I live-trapped an active, scrappy male for banding and then decided to observe him in a cage for a few days at home. I brought him down in the trap but, in attempting to transfer him to a cage, he slipped deftly from my fingers and escaped. The second morning after, to my surprise, he appeared in another trap in the same *mamani* (mā′-mă′-ni) tree in which I had caught him before.

A MOUNTAIN HERMIT

The *omao* is a bird of the humid forests of the lowlands and middle elevations—or so we had believed. You can imagine our surprise then, when we found it living high on the slopes of Mauna Loa, on the rough lava flows above the last trees of the timberline. In the lowland forests, *omao* feeds on small fruits of various kinds, but the fruits of the *ohelo* (o-hē′-lo) and *pukiawe* (pū′-kĕ-ā′-wĕ), shrubs which grow on the almost barren lava of the high slopes, have offered a food supply adequate to lure these hardy birds up into the wind-swept, chilly lava fields away from the more moderate climate of the lower forest. That the *omao* does feed on the small fruits of the *ohelo* and *pukiawe* is evidenced by signs seen abundantly on their conspicuous rock perches.

VOLCANOES AND BIRDS

The tremendous phenomena of volcanism must inevitably affect wildlife; yet the purely direct effects are small. On the night of May seventh, Sarah and I witnessed the spectacular lava fountains at the source of the 1942 lava flow on Mauna Loa. While lying stretched out on the warm lava, we saw white-tailed tropic birds soaring near the swirling fume column and lit by the lurid glow of the molten lava. These cliff nesting sea birds had been attracted from many miles away. Dr. Jaggar, the volcanologist, saw the unhappy result of a visit of *koae* to

an eruption scene in 1915. A pair were circling about the interior of Halemaumau caldera, when curiosity carried one of the birds too near; it lighted on the black floating skins over the fiery lava, was instantly overcome by the gases and heat, and flashing into flame became a glowing ember that was soon engulfed.

Suffocating, irritating gases can quickly destroy wildlife. In the 1931 Kilauea eruption a white-tailed tropic bird, overcome by fumes rich in sulphur dioxide, fell senseless on the rim of the crater. A quick death would be the fate of a *koae* nestling trapped in its rocky nest in the crater walls. Though breezes would quickly disperse and lift them, volcanic gases rolling across any forested section would undoubtedly kill many birds, mammals and insects. Many tests for gases in underground lava tubes have been made near Kilauea but have invariably failed to show accumulations of carbon dioxide or noxious fumes, as the rock is too riddled with fissures to retain them. Near Kilauea we once found bones of the introduced mynah birds in the inky blackness of a lava tube a hundred feet or more from the entrance, but they probably died from causes other than gases.

The Hawaiian name for the olive-green creeper is not known with certainty. The bird is green with pale, whitish throat and breast and has one of the shortest, straightest bills in the Hawaiian nectar eater family. It creeps along branches searching for insects.

During eruptions when lava is squirted into the air from fissures in the earth, globules of the viscous liquid are drawn out into fine, glassy threads. These instantly solidify, break away to be carried aloft by the warm air, and are dispersed over the surrounding country by winds. In Hawaiian lore this material is said to be the hair of the goddess of the volcano, *Pele* (pĕ′-le). A bird's nest constructed of *Pele's* hair was discovered in 1881 about five miles south of the crater of Kilauea, and a second was found in 1943 in the same locality. While the first one was new when found and lined with roots, the second was years old and showed no evidence of roots or feathers with the glass threads. The latter is composed of many thousands of strands arranged to form a cup-shaped nest with a cavity of two and one-quarter inches across and one inch deep. Dust and ash have solidly infiltrated the structure, and sand-laden winds have eroded it. This nest was found in a large crack of earth on a ledge two feet below the ground level. The skylark is the only small ground-nesting bird I know in this desert area, and it was introduced to the islands way back in 1865. Perhaps it built the glass houses? The *omao,* too, is a possibility.

EMPTINESS AND FULLNESS

A significant but indirect effect of volcanism on bird life is the result of forest and plant destruction by lava inundation and ash deposits. Large

areas of mature forest, brushland, grassland—all can be destroyed in a matter of hours—and Nature must then re-form, through long years of effort, the soil and its concomitant vegetation. Such happenings can destroy favored bird habitats; and where species are localized as they often are on volcanic islands the effect may be drastic. In the national park we have earth surface areas which date from May, 1942, and back, probably, to many thousands of years ago.

During the gradual formation of the soil and development of plant life from a skimpy first cover of lichens, mosses, low-growing ferns, grasses and herbs through shrubs and sparse pioneer forest, a succession of different bird groupings utilizes the land. Wide-ranging species such as the plover and turnstone, first enter the region of a barren lava flow. Seeking, perhaps, the protection of the very emptiness of the region. As seeding grasses and shrubs gain a foothold in the soil of crevices, the seed- or fruit-eating mynah, house finch and pheasant enter. The advantages of the increased variety of food and nesting sites afforded by the young forest then draw insect eaters, nectar eaters and more seed eaters, such as the *amakihi, apapane,* ricebird and skylark. With the increasing density of the understory come the *elepaio* and hill robin, while the skylark is forced to leave. Thus, through the years and ages, flows the widening stream of life. In the drier forests the changes occur much as just described; in the wetter forests different groupings occur.

THE *NENE*

A most important Hawaiian bird is the *nene,* or Hawaiian goose. It is in danger of completely disappearing from this island, now its only home, as it did from Haleakala on Maui many years ago. The population has been estimated at fifty wild birds for the past five years, and I have no data to indicate that present numbers may be much more or less than this figure. It will take a full dress life history study made in its breeding range, an area outside of the national park, to definitely work out specific causes of its decline.

Pigs, mongooses, feral cats and dogs, cattle, sheep, goats and rats, as well as possibly competing pheasants, quail, turkeys and peafowl are introduced animals that have modified the ancestral *nene* range or acted directly upon elimination of the *nene.* Roads, structures, ranching activities and shooting are a few disturbances resulting from man's occupation of the land that the *nene* must endure. It is extremely encouraging that this large and beautiful bird has held on during the past twenty years; in view of this it appears practicable to determine what ails the species and learn how to nullify the effects of at least some of the hostile conditions in its environment. In the meantime we must hold our breath and hope that

ABOUT THE AUTHOR

PAUL H. BALDWIN first visited Hawaii National Park in 1937, and has worked there continuously since April, 1940. During the first year and a half his assignment was to make an ecological survey of the native Hawaiian birds to determine their present status in the park, as an Emergency Conservation Work project. At the start of the war this project was suspended, and Mr. Baldwin is now Assistant to the Park Superintendent. He was president of the Manuiki Audubon Society of Hilo at the time it was last active until the start of the war.

Sarah Carmichael Baldwin painted the watercolor sketches. These, her first bird paintings, were made after many months of patient field work in the Hawaii National Park forests with the author, her husband. Each bird is portrayed on a characteristic native tree or shrub, giving it added authenticity.

it will continue to persist until such steps are taken.

CONSERVATION

Conservation-minded readers will want to know what is being done in the territory at large to insure the existence of the unique birds of Hawaii. All native perching birds have long been protected by statute, but the laws were passed too late to save two feather cloak birds, the famous *mamo* (mā′-mo) and *oo* (ō-ō′) of Hawaii Island, extirpated around the turn of the century perhaps largely because of plumage hunters. Some of the other birds have gone now, too, though J. d'Arcy Northwood, president of the Honolulu Audubon Society, recently had the pleasure of seeing an *akialoa* (ā-kĭ-ā-lō′-ă) of Oahu, a bird thought to have been extinct for a hundred years.

The greatest disaster for our forest birds is total destruction of the forest, as occurs on plantations, ranches, and farms. Forests in ranching country are still disappearing, so the bird populations will be further curtailed before the limit of destruction is reached. However, some types of forest have survived well one-hundred-fifty years of cattle grazing and, though much modified from their original condition, will probably continue to exist for a long time. I recently visited a forest of this sort on the Puu Lehua ranch in Kona. While I found *iiwi, apapane, amakihi* and *elepaio* to be common, I did not see any trace of the always rare *palila* (probably pā-lī′-la) and *hopue* (hō′-pū′-e), or koa finch, found there by Palmer and Munro in 1891. The suitability of forests for native birds is apparently diminished through loss of primitive conditions.

Although the National Park Service will do its utmost to preserve primeval conditions, the forests involved are exceedingly small compared to those already destroyed and modified. The territorial forestry service is preserving large forest tracts for watershed purposes. This helps to perpetuate native birds, but a drawback to these reserves as "bird sanctuaries" is the planting of exotic trees which grow faster or may be of greater economic value than native trees. This practice alters the character of the forests, and the birds may not be able to adapt readily to the new conditions.

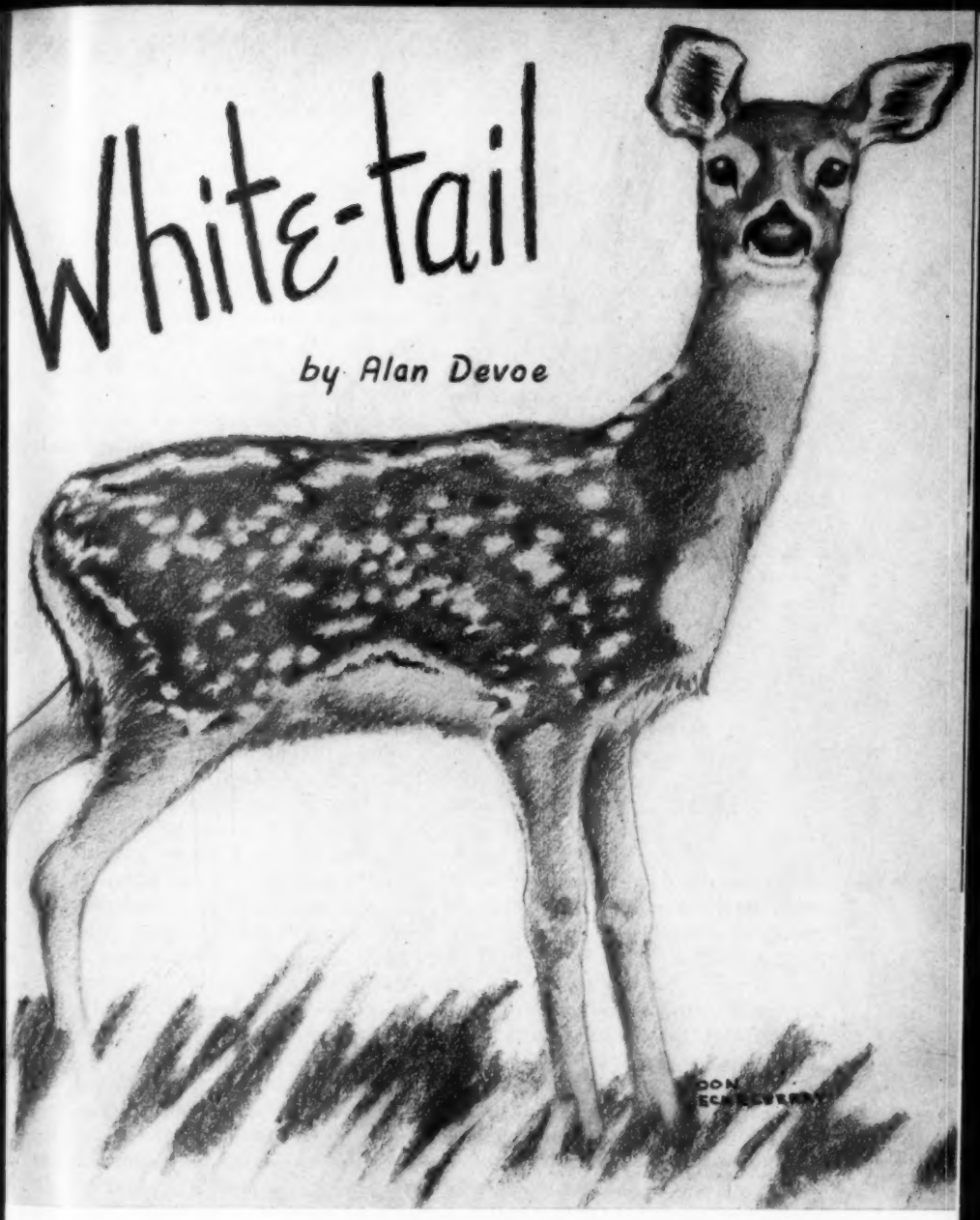
BIRD IMPORTATIONS

Another danger to native birds is the fashionable practice of importing exotic birds. At least twelve of these foreigners have become well-established in the park. Some are exceedingly abundant, such as the house finch, introduced from California prior to 1870, and the hill robin, or liothrix, introduced from the Orient in 1928. The park does nothing to encourage these little invaders, and if we could we should exclude them, for they bring appetites and psychological traits, as well as diseases, that oppose the interests of our native birds. An alternative outlet for the bird lovers' desire to improve the local avifauna would be to bend all efforts toward rehabilitation of our many beautiful and interesting native species.

The birds of Hawaii National Park constitute one of the unique values preserved amid volcanoes and forests for the enjoyment of the people. Much more can be learned and told about our birds: the nesting of the elusive *omao,* for instance, the story of the little *akepa,* and the mysterious decline of the *ou.* For all who take pleasure in nature, this island wilderness will yield many rewards for the hours spent in watching its bird life.

White-tail

by Alan Devoe



IN a concealing thicket in the May woods, in the season when forest earth gives off the smell of rain-wet leaf-mould and green growing things, a fawn crouches motionless. He has been born not long ago. Alone in the spring universe into which he has newly come, he crouches in a hollowed form of grasses. He is a white-tail, *Odocoileus virginianus.*

The little fawn lies very still in his form. The big ones of his tribe measure six feet in length, stand three feet high at the shoulders, and may weigh nearly three hundred pounds; but the young fawn is tiny. His dappled body is not more than sixteen inches high. He weighs only about five pounds. A fox could carry him off. So now, while his mother has left him for a while, he lies extremely still in his hiding-place. His spotted infant-coat has been given him for good reason. While he lies motionless, the dappled hide blends with the sun-flecked pattern of the leaves, and the fawn is rendered nearly invisible. Motionless, he does not give off scent.

Presently, as the fawn lies quietly with slim legs tucked under him and great dark eyes watching the wonder of the green world, a sound comes to him. It is a faint little sound: soft, whispered bleating. To the fawn it is instantly meaningful. He cocks his head, turns the hearing-funnels of his velvety little ears. Again the soft bleating comes. It is the special sound of a doe, speaking to her little one. When his mother left the fawn in his form, she conveyed to him that he must flatten himself in his place of concealment and stay perfectly still. He has obeyed her. It is the instinct of wild young ones to obey. Now his mother is softly calling to him a new order. "Get up! Come! Follow me!" The fawn struggles to his feet, wobbling a little on his heart-shaped pointed hoofs. He stares through the underbrush to see which way he must go.

The tail of a Virginia deer is nearly a foot long, and rather bushy. When held downward, pressed against the body, it shows only an inconspicuous brown, the color of the rest of the deer's coat. But when it is raised it shows the flashing white of the underside. It becomes a signal-flag. The fawn is watching for that signal. Presently he sees it, a quick white glimmer among the tree-trunks. Instantly he gives a little bound forward, and trots out from his cover to follow where his mother leads.

She brings him through the woods to where a trail winds and twists gradually along a downward slope, coming at last to a little stream or woodland pool or low marshy meadow. The way of deer in summer is to come down to the low ground to feed and drink in the evenings and early dawns, retiring for noonday to the deep woods. As the shadows of late afternoon lengthen now, the doe crops the cool damp grasses at the water's edge, and the fawn, wobbling under her and nuzzling her warm belly, suckles and is content.

As dusk comes down over the woods, the doe is off up the trail again. Stiff-legged, weary, the fawn follows the glimmer of her white banner in the twilight. It leads him to his "form" again, and there, almost instantly, he falls asleep. He does not feel the doe licking him and smoothing his spotted coat, as a mother cat tends a kitten. He does not know that all during the night she is only half asleep, her tawny ears cocking in the darkness for the sound of a twig snapping, her dark soft nose raised again and again to test the night air.

During succeeding days the fawn learns many things. At first, while his legs are still uncertain, his mother makes him stay in his form, coming out only when she summons him to follow; but in a little while he is going almost everywhere with her. The first thing a white-tail must learn, as must most other animals, is how to use his legs. He must become expert in the special gaits of deer.

In addition to walking, deer have

three gaits: a trot, a gallop and a run. The run is young white-tail's gait when he has been suddenly startled, close-up; he just streaks through the woods as quickly as he can. The trot is a brisk and dainty prancing. When white-tail trots he holds his head stiffly erect, and throws out his legs with a proud free swing. The gallop is deer's gait when they have caught sight or scent of danger that is not close enough to demand that they "run like deer." It is the gait man most often sees deer using. Little white-tail learns, in the gallop, to progress in a rhythm of three or four long springy bounds, and then a great leap in the air, and then three or four more bounds and then another high curving leap. White-tail must practice. The hoof-movement of deer is not that of "diagonal" runners, like horses, but is "rotatory." That is, white-tail's hoofs strike the earth in this order: right forefoot, left forefoot, left hindfoot, right hindfoot, right forefoot again. It is the same gait used by foxes.

While young white-tail is perfecting the art of motion, he is learning many other things. Before he is very old he meets the other members of the herd, and thereafter lives most of his life in community with them, for it is in his blood to be gregarious. He is initiated into signals and stratagems which the deer-herd uses for its protection.

There is the urgent danger-cry. It is a cry something like a cough, or like a gruff little bark. It sounds like *Ka-a-a-h!* The deer makes it by blowing air with sudden violence through his nostrils. When young white-tail begins uttering the sound himself, his fawn-noise is a kind of feeble whoofle. As he grows older he attains the grown-up quality of gruffness. He is learning many other deer-ways: how

Walter E. Hastings

This Bambiesque photograph of young white-tail shows a little fawn's interest in his bright new world.

to distinguish different kinds of twig-snapping when he hears them, how to confuse the scent of his track, and the necessary modern-day craft of crossing highways safely. The common way of road-crossing, white-tail learns, is for one member of the herd, usually a doe, to advance to within about a rod of the roadside while the others hold back. The advance-doe stops, looks and listens. If all seems well, she flirts her tail vigorously, showing the white signal flag. Then she walks slowly

Allan D. Cruickshank

These mule deer, white-tail's western cousins, flaunt the appropriateness of their name.

and alertly forward to the road's edge, and the rest of the herd advances to where she was previously standing. At the roadside she again pauses, looks carefully both ways, raises her signal-flag, then vaults across the road. Reaching the far side, she makes one final reconnoiter. Then she gives her white flag a last triumphant flip, to say "All's well," and the herd goes trooping across the road.

When September of his first year comes, young white-tail has learned the basic woods-lores he must know, and he has begun to undergo a change in appearance and temperament. Deer change to a winter coat in autumn, and in the process young white-tail loses his fawn-spots. He has grown to be about half the size of his mother, and his coat is the winter coat which all deer wear: a heavy grayish brown, replacing the light reddish brown of the short summer coat. His throat and underparts are white, and the cartilage of his nose, the tips of his ears, and a pencilled rim around each of his dark eyes, are black. With the taking on of his adult dress he has taken on also a new attitude toward his mother. Gradually he ceases to follow her, to regard her white signal-flag as a guide which must be obeyed. He comes to nuzzle less often at her warm belly. The taste of milk loses its charm for him. Young white-tail is half a year old now, and he has been weaned.

His diet grows comprehensive. He finds he likes almost every kind of leaves, grass, moss, buds, berries, fruit, nuts and mushrooms. Lichens, discoverable on the rocks, have a good taste, and so does cedar, and so do the fleshy lily-pads that he finds in his drinking-pool. He comes to wander considerable distances, as all deer do, in search of fallen acorns, beechnuts and chestnuts.

White-tail has no front teeth in his upper jaw, and only eight front ones in his lower. Deer crop and nibble their food, and then chop it up with the strong grinders at the back of their mouths. White-tail's way of eating is like a cow's. When he has cropped a mouthful of leaves or forest moss, he chews and re-chews it as a cud.

In white-tail's second Spring, there swell upon his forehead two little knobs. They are the beginning of his antlers. They are brownish, covered with a soft velvety substance, warm to the touch. Deer-horn is true bone, as hard as any other, when in maturity; but during growth it is soft and tender and fed by blood-vessels. It has the same temperature as the deer's body, and is part of his flesh. In the second summer of a buck's life, into which white-tail has now entered, the antlers grow from little velvety knobs, in May or June, until they have reached, about August, the full development of "first antlers." These are single spikes of curving horn, making their wearer what is called a spike-horn. By his third summer a buck has developed one tine on each antler and becomes a "Y" buck; and additional years bring additional tines.

Deer-antlers are developed, matured, dropped off and then replaced with new growths, almost like leaves of a tree. The growth starts afresh each spring, from a little bony plate on the forehead. Until September the horns grow rapidly, in the soft fur-covered skin which is their "velvet," and during growth they remain warm, pulsing with blood. In September they begin to harden. They begin to become solid bone. The buck rubs them against the trunks of saplings, scraping off the furry velvet. By October the antlers are hard and insensitive, the nerves withered in them, the blood supply withdrawn, the bone polished from rubbing against trees. For three or four months the buck wears the mature set of antlers. Then, between the first of January and the first of March, the antlers become brittle; they loosen from their foundations on the skull. There comes a day when, brushed against a branch, they are knocked off.

In his second summer now young white-tail, spikily antlered as evidence that he is coming into maturity, lives much as he lived the year before, after he had grown out of early fawnhood, but with new expertness and sureness. He has forgotten by now who his mother is, and he is as adept at snorting a gruff alarm-cry or sailing in a great arc over a brush-fence as any of his elders. He grows wise, on the daily dawn and dusk excursions along the trail to the lowlands, and in his stray wanderings away from the rest of the herd into the dim green solitudes of the woods at noonday, in many lores. He learns, during the hot days of midsummer, to keep cool and escape mosquitoes and midges by going to a lake or forest pool and swimming far out among the cool lily-pads and immersing himself until only the tip of his nose and the top of his head are exposed. He lies there blissfully like a submerged hippopotamus. White-tail acquires the lore of killing a snake, which he dreads as most wild animals do. When he comes upon one in his path, he makes a high leap almost straight in the air, and as he leaps he bunches his four hoofs together, with their sharp fore-edges pointed downward. They come down compactly, with the weight of his hundred-odd pounds behind them, and the snake, unprepared to strike straight upwards, is cut to pieces. White-tail learns many a woods-prudence, not least the wisdom of taking his noonday nap on the highest hilltop in the countryside, that he may watch for danger from a vantage-point.

There comes a time in October when white-tail feels a change come over him. Until now the dominant note in his spirit has been peacefulness. He has wanted no more than to browse, to sleep, to lie chewing his cud placidly in the green hush of the noonday woods. But now, as the leaves begin to fall in his second autumn, he feels a strange combativeness steal over him, and there is a new attitude toward his fellow-members of the herd. The bucks have been his friends; suddenly he feels them to be rivals. The does have been his friends; suddenly he feels them to be his possible mates. White-tail's neck is swollen far beyond its normal size. On a day in late fall, white-tail hears in the woods the sound of the clashing of antlers, and suddenly for the first time it is meaningful and exciting to him. He gallops to the scene of the sound, and, meeting a buck, paws the earth and snorts and lowers his spiked head. Little white-tail, his primary deer-lore learned, his fawnhood put behind him, has come to the moment of maturity.

The WILDLIFE COMMUNITY

This article will help you find the key to the fascinating story that is written across the face of every landscape.

By Richard H. Pough

WHEN you look at a landscape, what do you see? What do the living plants and animals that are present tell you of the area's past and future? Why are only certain forms of wildlife present in any given place? Can you visualize the dynamic cycle driven by the sun, of which a landscape is the tangible manifestation? If not, you are missing as fascinating an experience as the world has to offer. You are also seriously handicapped in any attempt to analyze or solve wildlife conservation problems.

What is wildlife? To many people only birds and mammals are wildlife. As currently defined, however, the term includes all living organisms be

they plant or animal so long as they are living on their own. Although we do commonly distinguish between indigenous species that have evolved in or migrated to the area in question without any aid from man, and exotics that are present because man has intentionally or accidently introduced them to the area—all are considered wildlife if they are now living and maintaining themselves in the area without human help.

When you talk about conserving wildlife, what do you mean? Sportsmen frequently take it to mean the rearing of game species in captivity for liberation just before the hunting season opens. Foresters often regard the planting of pines in solid rows like so much corn, as conservation.

In some cases it becomes difficult to draw a really hard and fast line between agriculture or animal husbandry and wildlife conservation. Many once wild species are today living more or less unnatural lives because of human influences. Deer populations, for instance, must be managed artificially now that we have eliminated the predators that once provided a natural control other than the ultimate one of starvation and disease.

THE WILDLIFE COMMUNITY

The key to an understanding of the whole subject is to be found in the wildlife community. Living things do not exist in isolation. Each is part of a closely-knit community of living plants and animals. Every plant and animal present in such a community has a job to do, a function to perform, just as you and I have our jobs to do as part of a human community. In the wildlife community, as in the human one, the welfare of all the inhabitants depends on the continual presence of all the functional groups which together constitute a balanced community.

Each homogenous landscape unit which you see constitutes such a community. It may be large in area or small; it may occupy a body of water, dry land or a rocky outcrop. For every conceivable site and climate nature has evolved some sort of wildlife community. These various communities which we find existing side by side in any given region bear a very interesting relation to each other. Through the action of life processes the original site differences tend in time to be obliterated. Thus the many small local communities resulting from original differences in the sites they occupy gradually merge into a single more extensive and relatively homogenous community whose character is determined more and more by climate alone and less and less by any differences in the underlying soil and water characteristics of the local site.

THE BIOME—A SUPER ORGANISM

Recently the term biome has been coined to describe the whole complex of wildlife communities in each region where the same type of community ultimately develops in response to climate. The different pioneer stages are regarded simply as immature units of the biome organism. The final stable stage which represents maturity is termed the climax stage because climate is the controlling factor in determining its character, and within any given biome this stage is the same over the whole region occupied by the biome in question. Biomes are given names based on the dominant plants which establish the general character and appearance of their mature stage. In the following detailed discussion we will use the deciduous forest biome

Paul Fair

Antelope cannot live in the woods but are uniquely adapted to converting the vegetation of arid country into meat.

of eastern North America as our example. Within this biome the particular deciduous trees which constitute the climax stage will range from oaks and hickories in the west to beech, sugar maple and hemlock in the northeast as a result of minor variations in the climate—chiefly that of rainfall.

We know that when southern New England was settled by the white man, sufficient time had elapsed since the last glacier for the biome to reach, on most sites, something approximating maturity so that much of the area was covered by a vast deciduous forest. In order for it to have reached this final stage, pioneer and then various subsequent developmental communities had had to occupy the different sites and alter them until they offered suitable soil and moisture conditions for the mature or climax stage.

Even before the coming of the white man, fire and wind often arrested or set back this process but now the axe, the plow and attendant soil erosion have virtually destroyed the climax forests and again fragmented the area into individual communities representing every conceivable stage in the slow development from open water, bare subsoil or rock, back to climax woodland. Thus the whole developmental process whereby mature units of a biome are ultimately created is being reenacted before your eyes if you can but read the story.

Let us trace the process in detail.

THE BIOME'S LIFE HISTORY

A unit of a biome can be said to have been born when the first seed starts to grow on an area of previously bare ground. In a typical case, its infancy may be characterized by a growth of annual and, later, perennial herbaceous plants. Our landscape at this stage, will be an ordinary weedy open field. Associated with these herbs will be plant-eating animals such as insects and mice. Present, also, will be such animal eaters or predators as insectivorous birds, weasels and many others. All these forms of wildlife and many others live together as an organized community, each member performing functions which benefit the others. Such a community bears little resemblance to the beech-maple forest it may ultimately become, but then neither does an ugly duckling bear much resemblance to the gorgeously plumaged drake it will some day be.

Returning to our landscape, we find that another stage has been reached when the shrubs have largely supplanted the herbs. Insects that feed on these will have supplemented in importance and will in time replace the earlier insects and rabbits, as well as mice, that may be present. Chats, catbirds and others will be part of this stage of the developing biome, as well as the rabbit-eating fox.

One stage follows another. Our landscape changes. Pioneer trees, like the gray birch, supersede the shrubs, while in time black cherry and others become dominant only to be ultimately crowded out by the taller oaks which, in turn, eventually give ground to beech and sugar maple in the moist climate of southern New England. Thus we see that each stage is characterized by definite species of plants, plant-eaters and carnivores. Although their functions within the community will be much the same, the actual species of plants and animals involved will be different in

each stage of the progressive development of our biome unit.

THE FORCES THAT PRODUCE SUCCESSION

From the first, there are forces at work within these communities which govern their growth and development through stage after stage, until the mature one—the climax community—is finally achieved. The most important of these forces is the constant competition which goes on between organisms which perform like or similar functions in the life of the community. Among the dominant plants, the competition is for light and moisture where rainfall exceeds a certain minimum, plants of larger and larger life form succeeding each other, until finally only trees whose seedlings have the ability to germinate in forest soil and grow in the shade of the forest are present. In the moist climate of southern New England these are chiefly beech, sugar maple and hemlock.

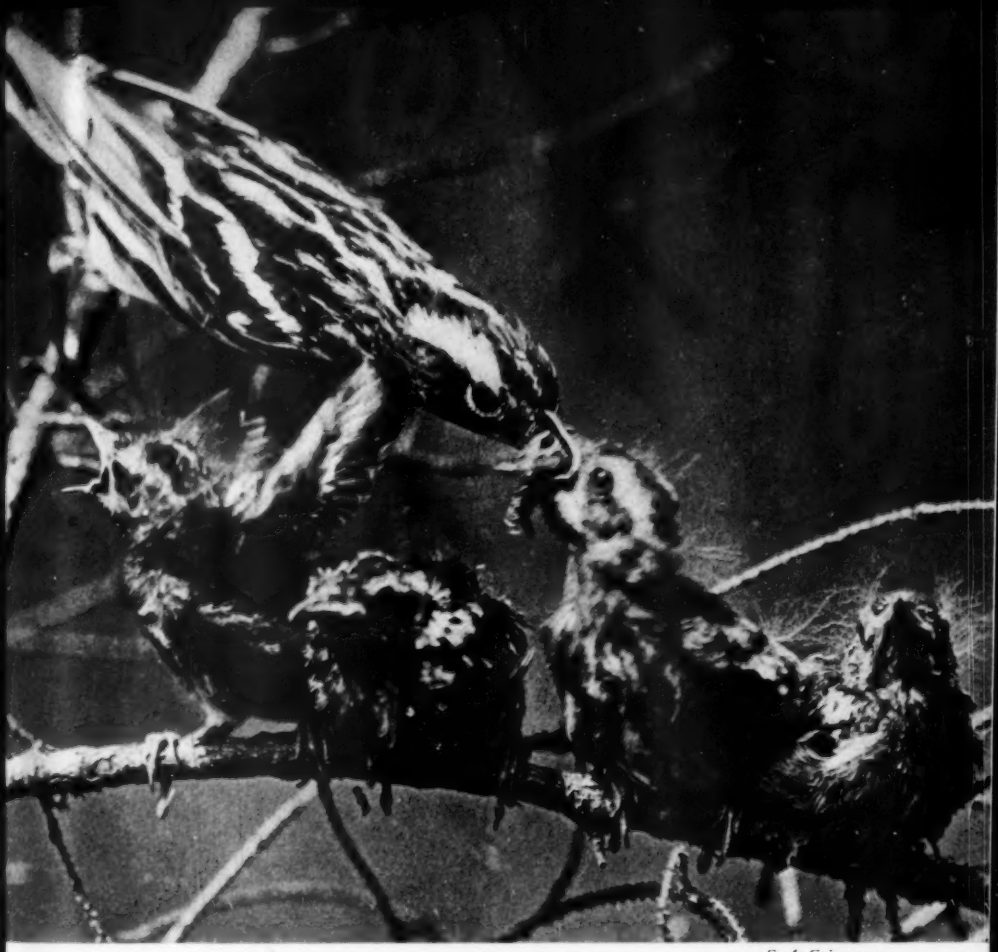
The establishment of such a climax forest is frequently a slow process for the soil must be conditioned for it. The earlier communities slowly build up the fertility and moisture-retaining properties of the original mineral material transforming it into fertile soil capable of supporting the trees of the climax community or mature stage of the biome. This process takes place as a result of the accumulation of what we might term the waste products of the different developmental communities that successively occupy the area. To these products we give the collective term "humus" and as they fall to the earth, they tend to build up the ground level of wet areas and make the soil of dry areas more and more sponge-like enabling it to hold water over dry periods. As a result of this, the moisture content of the soil tends to become similar regardless of original site differences and, therefore, most sites ultimately become capable of supporting the climax community.

The whole process of succession is so complex that it is impossible to go into any greater detail in this article. It is, however, a fascinating subject for further study, a unit of the biome being the same at maturity whether it was born on bare rock or in the open water of a pond. In one case, the early stages have aided in the disintegration of the bare rock and the transformation of it into rich, moist soil. In the other, the end products of the life of the early stages of the biome have accumulated until the pond has been completely filled, enabling a climax beech-maple forest to grow where a pond once stood. Here in New England when beeches, hemlocks and sugar maples have established their dominance, our particular biome has reached maturity. When we look out on a landscape filled with these trees, we are reading the final chapter of its story. Nothing can supplant a dominant growth of these trees unless the climate changes or some outside agency interferes. The period of infancy and adolescence of any given biome unit may be only a few hundred years, or it may be thousands, but once the unit is mature, it may live for tens-of-thousands of years virtually unchanged.

EVERY SPECIES HAS ITS OWN NICHE

How does this story, written across the face of the landscape, help us to understand wildlife conservation?

First, it makes one most important point clear. As each stage of the growth of this living community is characterized by the presence of different species of plants and animals we cannot expect a plant or animal to live and thrive in just any environ-



S. A. Grimes

As a member of the climax woodland community the black and white warbler is assured of a more permanent residence on an area than such species as the chestnut-sided.

ment. An animal in nature is a functioning part of some stage, of some biome. But in the wrong stage it dies. Millions of dollars have been wasted and are still being wasted in this country every year trying to do just this very thing. Fish and game are constantly being liberated by well-meaning sportsmen in areas where there is no need for the function they can perform, and when nature has no need for a creature, it is quickly eliminated.

Deer cannot live in a grassland; antelope cannot live in a forest. Ruffed grouse have a place in woodlands, prairie chickens in grasslands and no amount of stocking will enable them to live in each other's habitat.

WILDLIFE CAN BE SAFELY CROPPED

What else can this biome concept teach us? Primarily, it should make us realize that the obtaining of an annual crop of any wild plant or ani-

mal is contingent upon the maintenance of a healthy biome. Furthermore the biome must be the right biome and it must be at the stage of its life cycle where the desired plant or animal constitutes a normal functioning part of the biotic complex. To be healthy, a biome must have *all* its normal functioning parts (i.e. all the plant and animals native to it). What is more, they must be present in those balanced ratios which the slow process of evolution has established as normal for each biome in each of its phases and stages of development.

The taking of a game crop from a biome may be likened to the taking of blood from the human body for a blood bank. A game bird or a fur bearing mammal may be just as necessary a functioning part of the biome in which it occurs as blood is of the human body. In either case, if the organism is healthy and the quantity taken is not so great as to impair its health, the loss can be rapidly replaced. Thus a moderate game or fur crop can be taken every year so long as nothing is done to impair the health of the biome organism, just as a blood donor can give a pint every few months without ill effect.

(*To be concluded next issue*)

Phragmites, a vigorous pioneer in disturbed marsh areas the world over, affords a niche for a very limited number of birds in our biome.

Allan D. Cruickshank

IS THIS THE ARMY?

Where sergeants call "fall out" to watch a sparrow hawk's flight, and the Colonel gives a private a list of birds to check?

By John Wanamaker

I WAS in summer session at Cornell University awaiting the arrival of my "greetings from the President." My only worry was that it would arrive before the date set for our Ornithology Department's annual summer bird census. However, my luck held out; I was able to complete the term and join the gang led by Dr. A. A. Allen on the all-day trip around Cayuga Lake. So it was that my last field trip as a civilian added five new species to my life list, making far easier the task of packing and storing clothing, and putting away my ornithological library.

Disposing of my pet birds, however, was another matter. Parting with them made me feel that I was giving up the life of a naturalist forever. The two cardinals whose constant singing had attracted so many visitors in the Ornithology Graduate Laboratory were separated. One went to another institution while the other was liberated—perhaps to mate with the female cardinal that had so frequently come to the open window beside his cage. Billy, the sparrow hawk, who had long known the freedom of the "Grad Lab," was given his liberty on a Connecticut estate.

Field glasses were left with a friend, to be sent to me later. I left for my induction station, carrying only my toilet articles and Peterson's "Field Guide to the Birds." At Camp, I was just another serial number. Would I ever be able to watch for birds again?

Had the army consulted me as to where I'd rather be sent for my basic training, I would have asked for Florida, the one state I had always longed to visit. The army did not consult me—but to Florida I was sent! As our troop train skirted the edges of southern Florida's coast line, I kept my eyes glued to the window, looking for signs of bird life. Others must have been doing the same for suddenly someone shouted: "Look! An eagle!" Sure enough, a bald eagle was flying very low and very close, keeping up with the train. While the eagle was still in view, I saw my first pelicans and pointed them out to some of the men. Then began a pageant of Florida bird life—gallinules, stilts, herons in quiet pools, gulls, terns and sandpipers on the ocean beach.

I tried to call out each new species and passed "Peterson" around so that the fellows could look up the birds for themselves. Forgetful of the intense heat in the train, we pressed tightly against each other on the shore side of the car. The highlight came when one soldier spotted a water turkey perched on a half-submerged fence post! During that afternoon, we clearly identified fourteen species of birds.

After arriving at Miami Beach, I sent for my glasses, but it was days before I was able to use them. We were up before dawn—drilling, exercising and attending lectures. Over on the drill field, previously a fine golf

course, there were birds, of course, but I was too busy and exhausted to watch them. But one morning, in the midst of a drill, I heard a familiar scream. I seemed to forget left from right,

column movement from flank. The sergeant shouted at me time and again, but my thoughts were with the birds. Suddenly, above me, there was a whir of wings. Involuntarily, I glanced up and gave a shout:

"Look! A sparrow hawk!"

The entire platoon halted while we watched the bird hover over us, then drop upon a grasshopper and carry it off to the limb of a nearby tree. Even the sergeant was spellbound.

"Okay, men," he said, "fall out and let's watch to see if he does it again."

From then on I was known as the bird man and each new species was brought to my attention. Today, the soldiers in that group are scattered over the globe, but I still receive letters from some of them describing unusual birds which they are seeing in other parts of the world.

My next post was in Wisconsin, but birding was out of the question. My training program came during the night shift and days were for exercise and sleep. However, I did manage to get in touch with Dr. Aldo Leopold, so well known for his work in wildlife management at the University of Wisconsin, and he kept me posted of his seminars and of the activities of the local bird club.

During my spare time, I worked over my collection of kodachrome slides, which consisted of bird pictures of my own taking and of transparencies taken by Dr. Allen. I was preparing the slides for an institution, but in the meantime, I found a new use for them. When a friend was sent to the hospital, I visited him one evening, carrying along the slides and a small projector. Once I began to flash the pictures on the wall, the whole ward became an enthusiastic audience. Nurses learned of my visit and soon part of my daily routine included a showing of the kodachromes in various hospital wards.

Then the army moved me again—this time to a post in southern Florida, to a real bird paradise! No modern hotels and city streets here—but a lonely stretch of coast line, and tidal swamps with dense tropical foliage. Back of this was a land of scrub palmetto and pine, drained by canals choked with hyacinths. Although my days were filled, as usual, with study, exercise and drill, I did get a glimpse of such birds as Audubon's caracara, the purple gallinule and painted bunting. Then came real luck—I was assigned to the mosquito control program, to make regular surveys throughout the area; and best of all, my boss, an officer in the Sanitary Corps, was a naturalist! As we worked in the field together, tracking down the deadly malaria-transmitting mosquito, seldom did we let a bird escape our notice. One day the Miami papers announced that Dr. Frank Chapman, on his annual visit to Florida, had just observed the return of the swallow-tailed kite. Three days later, while we were collecting mosquito larvae in a remote section of the post near the Everglades, we saw the swallow-tailed kite in all its spendor as it soared and hovered above us!

For weeks, my assignment was classed as temporary and each call to report to the executive officer made

me fear that I would have to return to my old work. One day I was told to report immediately to a visiting Colonel. This is it, I thought, this is the end of my mosquito work. To my amazement, the Colonel handed me a list of birds. He had just been to the Florida Keys where he had recorded every species that had come under his observation. He wanted me to check over his list! Furthermore, he regretted that he could not go on a bird walk with me—but he was moving on! I left his office in a daze. Was *this* the Army?

As the summer heat became intense and bird life settled down to its inactive post-breeding lull, I was ordered north to Atlanta, Georgia. This new assignment gave me the chance to become more of a specialist in mosquito identification and control, but deprived me of the opportunity to be regularly out of doors. But there were compensations. On free afternoons and on Sunday mornings, I searched for birds in the nearby countryside. And I met congenial new friends. Among the officers in the department was a lieutenant who had led several expeditions to Mexico to study the flora and fauna of its little known areas. His ornithological publication, sponsored by the Chicago Museum, was already known to me. Another officer in our laboratory, had been a Cornell entomologist, and was acquainted with my friends in the Ornithology Department. We eagerly exchanged letters as they were received from the old gang, and compared notes on our current observations of bird life.

In Atlanta, also, I made the acquaintance of Athos and Sara Menaboni and frequently enjoyed the hospitality they extend at their woodland sanctuary. Through them, I met several of the local bird enthusiasts, as well as a fellow soldier, stationed at my own post, formerly an ornithologist and mammalogist for the Philadelphia Academy of Sciences. It was he who turned in the most interesting record in the last Atlanta Christmas Census when he flushed a short-eared owl to give Georgia another new bird to add to her state list of birds.

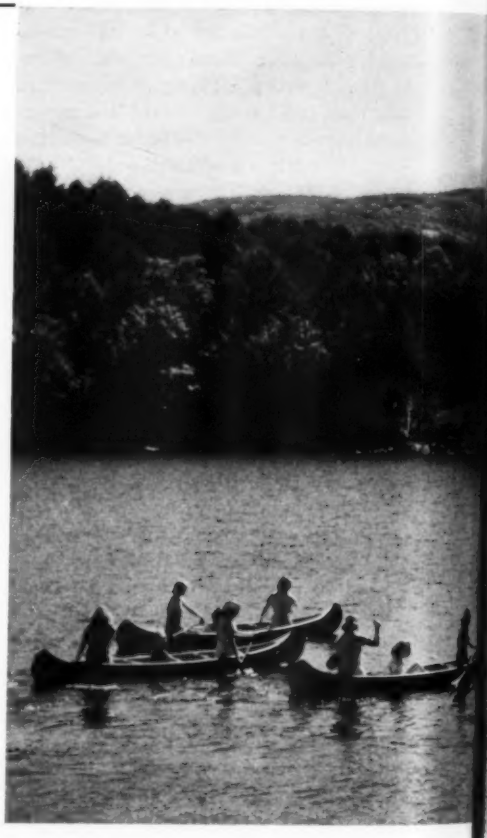
As I look back, it seems hard to believe that I once entertained the idea that service in the army would mean the end of birding for me! Now I know that wherever I may be sent, I shall find new birds, and through this common bond, new friends.

. . . They fell out and watched to see if the bird would do it again . . .

ON CHOOSING A SUM

How to evaluate and select a camp that will give the youngsters a worth

By Dorothy E. Bliss



ANOTHER summer is approaching. You, a parent, are facing the problem of how your child is to spend it. You ponder the advantages to be gained by your investing up to eight weeks of your child's time and up to five hundred dollars of your money in that unique institution, the American summer camp. You feel strongly that there must be a *right* camp for him and just as strongly that there are camps which would not be suitable. You grope for answers to your questions: should I send him to camp at all? if I decide to send him to camp, how can I find the right camp for him? what qualities make the "right" camp?

Never has it been more important for summer camps to justify their existence than it is today. Americans are examining their customs and traditions, are re-evaluating the standards of the past in view of a changing present and an unsure future. From the statements of service men and women, from discussions by leaders of the educational, legal, medical, social welfare, and ministerial professions, from articles by unbiased sections of the press, the thinking citizen is seeking to satisfy himself as to what in our economy is worth saving and developing and what should be discarded.

We who are concerned with camping have a deep-seated conviction that it is a part of education which must go on. At the same time many of us recognize that the aims and ideals toward which we are working may never be reached unless administrators awake to those aspects of camping wherein lies its great value. When a child is sent to camp, he should not be exposed to a projection of his winter existence, a life of physical, men-

MER CAMP

worth

ile experience in the world of nature

tal, and emotional competition, to the utter exclusion of all opportunity for acquaintance with the world of nature and for living within that natural world in relaxed cooperation with others. This is an age of overstimulation, an age in which there is little pause for reflection and relaxation, in which many people are forgetting or are never learning the art of close observation and sound thinking.

A willingness to study critically and open-mindedly its own program with the object of attaining a balance between competitive living on the one hand and cooperative living on the other should be an integral characteristic of every directorial and counsellor staff. No camp should fail to teach such socially and physically invaluable skills as tennis, swimming, canoeing, diving, riding, sailing, baseball, badminton. But any camp which stops there is failing to offer that aspect of living which, because our way of life is prevailingly urban, may often be experienced only in the summer camp: the outdoor life, not in a restricted sense but in the total meaning of the word—a living out of doors in an environment where birds, trees, flowers, ferns and small animal life are familiar, where group duties concerned with making and breaking camp are accepted routine, where the individual is not conscious of himself but is lost in healthy, happy integration with his fellow campers and his environment. He becomes a part of his small but important world.

For too long has the object of summer camping been to give the camper only what he thinks he wants. Of course he prefers those activities to which he has become accustomed at school and at home. Recall the oft-quoted remark to the effect that we do not know what we like, we like what we know. More advanced camps today are seeking to broaden their campers' interests, although much of this may be done unknown to the camper, by initiating him into new fields through the medium of an old, well-loved interest or activity. Let me illustrate:

What child does not enjoy getting

up at dawn, having cocoa and crackers in the camp kitchen, stealing off silently in a canoe, and later eating a campfire breakfast?

Campers are awakened at half past five. Quickly and quietly they dress, bottom their cups of hot cocoa, push off in their canoes, and move down the lake. Fifty yards, a hundred—a large bird soars overhead. "Buteo hawk," call out the few to whom the large bird is familiar. Another bird is sighted on the water. It screams with insane glee. A loon, of course. A third bird lands in a tree at the water's edge. "Let's go see it"—in low tones. The canoes change their course, they slide close to shore—their occupants get a superb view of a belted kingfisher in all his splendor. A tiny inlet is approached. Birds are sweeping back and forth from one tangle of underbrush to another. "What is it?" The counsellor points to the right and to the left, indicates one bird then another, one song then another. Within a very short time campers have listed some thirty species. When seven o'clock arrives and it is time to make breakfast, only those whose duty it is to build a fire and cook leave the fascinating inlet. The others continue the "hunt." Birding goes on during breakfast. Its allure grows. The trippers return to camp in ecstasies of delight at their successful outing.

What activities have been used in this instance to introduce a nature interest and in particular an interest in birds? Canoeing, getting up at dawn, picnicking—all were part of this nature "walk." Breakfasting out of doors provided opportunity for practice in cooking out, fire building, camp clean-up, and other chores. Campers have worked together. The spirit of competition has been secondary to the spirit of cooperation.

Predominance of group spirit will be apparent in the main camp itself if the camp is organized so that there is less emphasis on competition than on cooperation, if the ability to live happily and normally with one's fellows in an outdoor environment is considered of more importance than is the ability to outdo the other fellow in tennis, riding, or swimming.

If you can find a camp which stresses campcraft and nature, in

The scenes above, made at the Audubon Nature Camp in Maine, show campers inspecting a cormorant nesting colony, building a nature trail and examining insects. Although operation of the Camp has been temporarily deferred because of the war, the Camp is well-known for its work in training counsellors what to teach and how to teach it. This year the Audubon Nature Center, at Greenwich, will carry on in the same tradition. Four special summer sessions will be given for teachers, youth leaders and others interested in interpreting the out-of-doors and conservation to their communities.

particular one where they are correlated and thus considered only convenient subdivisions of the much more comprehensive and important field of outdoor living, you will have gone far toward finding a camp where your child will learn the true spirit of the group. A camp administration which recognizes the physical, social and intellectual benefits of a well-rounded outdoor life is usually one which realizes that out of this way of living grow group-minded individuals.

Let me emphasize again that to put the child out of doors is not enough. He must be at home with his environment if he is to feel part of it. He must know what trees are shading his campsite and what logs make good firewood. He should be able to predict the coming of rain as easily as he protects himself and his equipment when rain comes. He must recognize what plants are poisonous and what first aid to give if another camper should happen to touch them. He should realize that many hawks are beneficial, many snakes are an aid to man, forests must not be defoliated, small trees must not be uprooted, tree blazing must be done with care. The outdoors cannot be departmentalized. It does not consist of nature, campcraft, first aid, conservation—all separate, each entire unto itself. A camp should not teach it this way. It should instruct your child in *outdoor living*.

Many difficulties lie in the way of your finding such a camp for your child. Some administrators consider nature work a waste of time and an economic liability when compared with the gain to be derived from the devotion of an equal amount of time and money and an equally well trained counsellor to another camp activity. A few camp leaders feel vaguely that they ought to "do some-

thing" about nature. They have created a camp in the woods yet they are failing to open the eyes of their campers to their beautiful surroundings, failing to make use of unusual opportunities to teach important lessons in living. So they engage nature and campcraft counsellors. Believing they have done all, they turn their attention and their camp funds to other fields. The counsellors are left to carry on with a minimum of financial and moral support.

There is also the unfortunate circumstance that despite the best intentions in the world on the part of the director, he may be totally unable to find a trained nature or campcraft counsellor. This lack of trained leaders was never more painfully felt than it is today with the armed services making vast inroads into the supply of outdoor-loving young men and women. One of the most valuable organizations for the relief of this situation, an organization which has been forced to close for the duration, is the Audubon Nature Camp for adult leaders. It has supplied many camps with counsellors who have a solid foundation in what to teach and how to teach it.

When you decide that camp is the place for your child this summer, when you are convinced that he must have a happy summer but at the same time he must gain other benefits from his camp experience, when you start looking for a camp for him, what do you need to know about any camp under consideration?

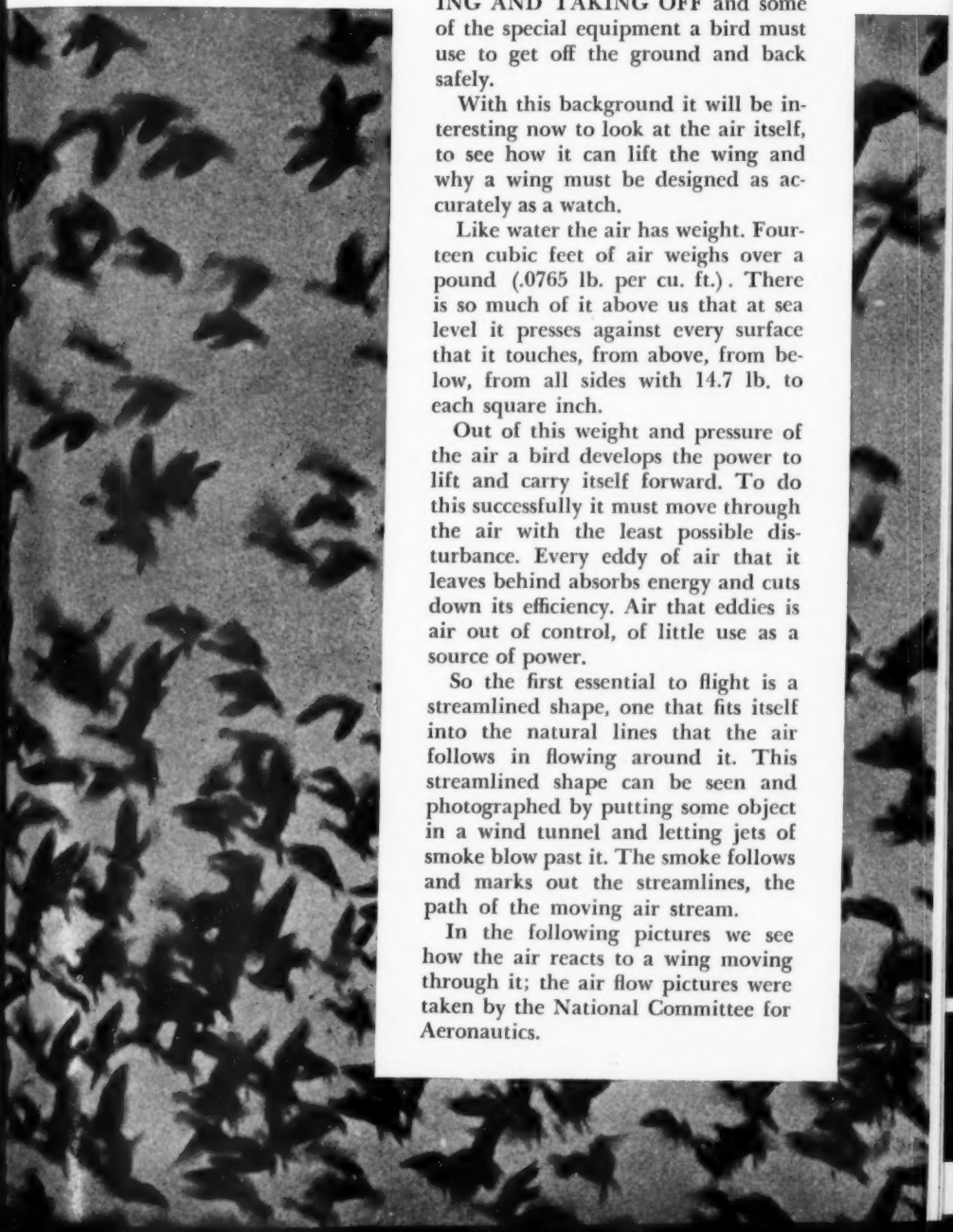
Find the extent to which an outdoor life is emphasized, the allowance made in the camp program for committee work, for group duties, and for other non-competitive activities, the degree to which your child can choose for himself, after introduction to all fields, those in which he prefers to continue. Determine the size of the camp, that it may be large enough to challenge but not so large as to submerge him. Ask the qualifications of the counsellor. A camp is only as good as its counsellors. Are they trained? Are they well-balanced individuals with a genuine interest in children? Does the camp offer nature, campcraft and conservation with an understanding of how closely the three are interrelated? What chance is there for your child, if he so wishes, to train for leadership in out-of-door activities?

Despite extremely heavy wartime demands, railroad officials are arranging with camp administrators for conveyance of children to and from summer camps. If you want to send your child to camp, wartime restrictions on travel will not prevent it.

Yes, his heart is young and gay. It should remain that way throughout a happy summer at the camp you choose for him but at the same time he should "grow in stature every day." Given the opportunity, he will learn to love the silent light of dawn creeping over the lake, the graceful sweep of the herring gull far overhead, the delicate song of the hermit thrush whose tone no man-made instrument can surpass, the sweep of the stars in their nightly march across the heavens, the haunting cry of the whip-poor-will, the majesty of the bald eagle, and the simple trust of the spruce grouse. In later years he will remember with pride that winning fight in his frail canoe against a boisterous head wind, those last few steps up a mountain peak, those delicious steaks cooked over an open campfire, the hours of companionship, song and story around glowing embers, and the happy excitement of nights in a pack bed with only the hard ground beneath and the stars overhead.

WINGS *AND* *THE AIR*

By John H. Storer



IN the two earlier articles on bird flight we have discussed HOW BIRDS FLY and how the wing and feathers are designed to make an efficient machine. We discussed LANDING AND TAKING OFF and some of the special equipment a bird must use to get off the ground and back safely.

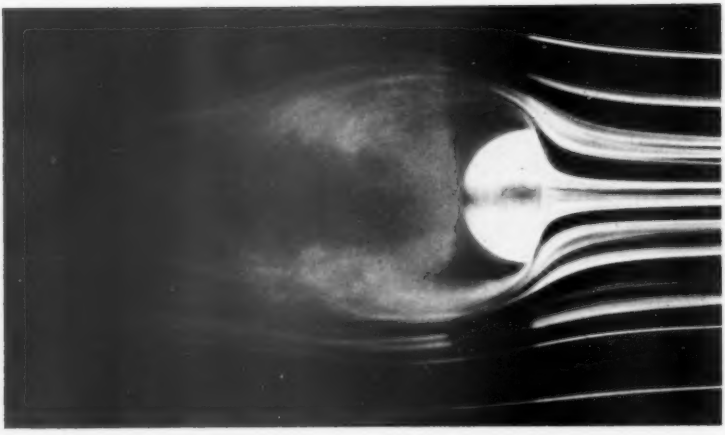
With this background it will be interesting now to look at the air itself, to see how it can lift the wing and why a wing must be designed as accurately as a watch.

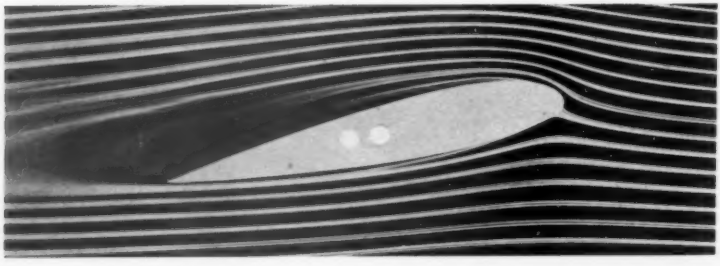
Like water the air has weight. Fourteen cubic feet of air weighs over a pound (.0765 lb. per cu. ft.). There is so much of it above us that at sea level it presses against every surface that it touches, from above, from below, from all sides with 14.7 lb. to each square inch.

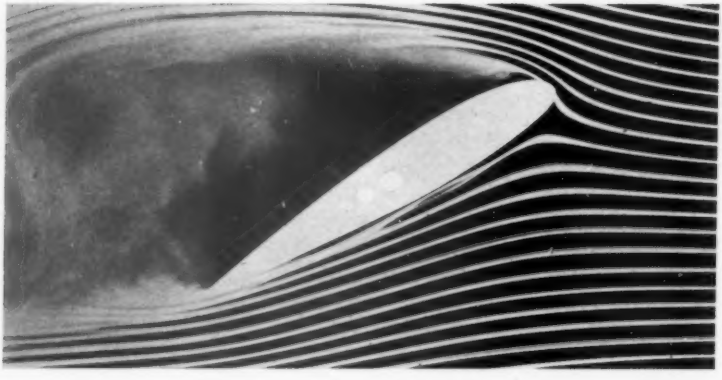
Out of this weight and pressure of the air a bird develops the power to lift and carry itself forward. To do this successfully it must move through the air with the least possible disturbance. Every eddy of air that it leaves behind absorbs energy and cuts down its efficiency. Air that eddies is air out of control, of little use as a source of power.

So the first essential to flight is a streamlined shape, one that fits itself into the natural lines that the air follows in flowing around it. This streamlined shape can be seen and photographed by putting some object in a wind tunnel and letting jets of smoke blow past it. The smoke follows and marks out the streamlines, the path of the moving air stream.

In the following pictures we see how the air reacts to a wing moving through it; the air flow pictures were taken by the National Committee for Aeronautics.







In the top picture
white lines are jets
smoke following the
ing air stream as it str
a half sphere (the w
object) in a wind tun

The white lines thic
against its face show
how the air is slo
down, increasing the p
sure against the face
the obstruction.

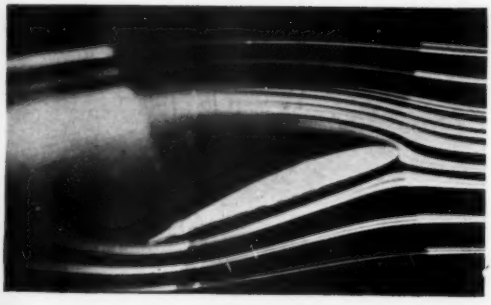
As the air flows arou
the object, it leaves
empty space behind
This is an area of
much reduced pressu
The fine curling li
show where little wisp
smoke are eddying i
the partial vacuum. T
main lines of the sm
stream gradually draw
gether again far to
rear. There is high p
sure against its front,
pressure against the b
surface. It would tak
great deal of power
drive this shape throu
the air.

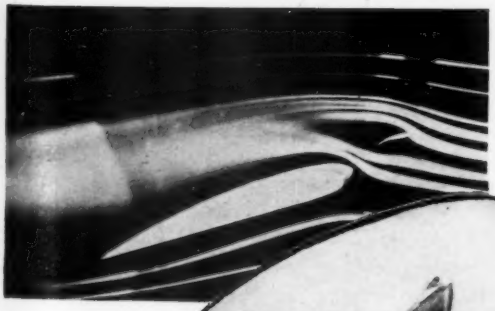
In pictures 2 and 3,
white lines of the sm
streams show what h
pens to the air when
wing stalls. In picture
the air stream has alre
begun to break away fr
the upper surface of
wing near its back. T
stall has started. No
that the smoke stri
the lower front edge
the wing rises and divi
part of it going up o
the top, forced up th
into the area of low p
sure by the high press
below. At a lower sp
this wing could be til
more without stalling.

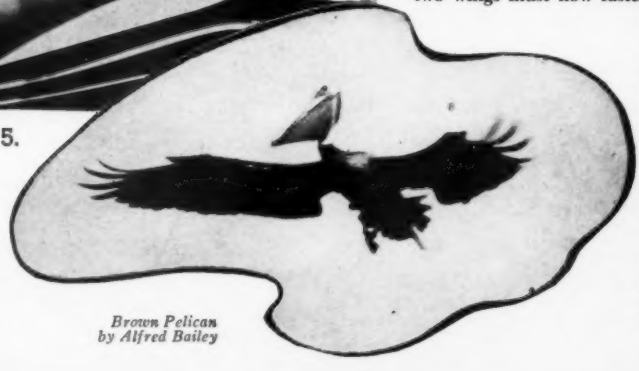
Notice that the wing's
surface accounts for m
of the change in press
—the lifting power—and that the lift moves toward the front edge of the wing as the angle of its tilt increa
tending to throw it off balance. The shape of the wing controls this movement of lifting power.

If the wing is tilted too much the air can't follow down the slope of the upper surface. The lifting power
appears and the wing is said to be stalled.

In picture 3, the wing has passed the stalling point. The air has broken away from its upper surface. The sm
smoke streams have broken up into eddies. The lifting power has turned into backward pressure or "dr







The feathers of a bird's wing are shaped to give it the proper streamlining and curves to develop lifting power. Near the front edge the small covert feathers stand up vertically from the skin, then bend backward at right angles to build the right thickness. Behind the forearm the secondary and covert feathers grow in pairs, each secondary with a curved covert arching over it. The curves are arranged so as to give the cross section of the wing the curved taper of a plane's wing, the chief difference being that the under side of the bird's wing is concave, a more efficient lifting shape at low speeds. The plane wing's underside is slightly convex (see opposite models), a better shape for high speeds.

1. Cross section of a pigeon's wing showing this feather arrangement.

2. A herring gull's wing, feathers removed to show one secondary feather with companion covert arching over it. Notice how the curves are strategically placed to give thickness near the front and taper off to the rear.

3. How a slot prevents a stall. In this picture, like the bottom one on the opposite page, the wing is past the stalling point. The smoke stream has broken away from its upper surface. It has lost its lifting power.

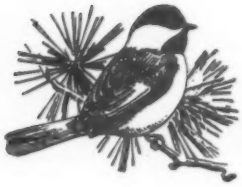
4. Here the wing has regained its lifting power. It is still meeting the air at the same angle. There is just one change. A small extra airfoil (wing) has been placed out ahead of the main one. (The little white line in the black space just above and ahead of the wing.) The alula on a bird's wing has the same effect when it opens.

The two white smoke lines that squeeze into one as they go through the slot between the two wings must flow faster in going through this small space. This added speed reduces the pressure over the wing. The picture shows the result.

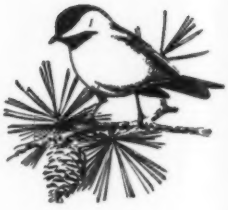
5. A landing brown pelican shows the alulas (airfoils) and slotted wing tips in use as the wings of a living bird duplicate the wind tunnel diagram.

Feather photographs by John H. Storer

Brown Pelican by Alfred Bailey



The Director Reports to You



AT this writing the height of the spring bird migration is on and waves of black-throated greens, black-throated blues, thrushes, orioles and tanagers throng our parks and even our city backyards. The frost has gone and the soil has warmed up, releasing abundant life; the ice has melted and our ponds and brooks are filled with developing insects, with frogs' and salamanders' eggs; the green grass has come with a rush, toads are trilling, trees are budding and blossoming. These are annual occurrences, still full of much mystery, yet of fundamental impact on the lives and fortunes of us all.

Do we find these happenings featured in our daily press, on the radio or in the day-to-day conversation of our people? We do not! We read of murders, bombings, coupons and rationing, labor troubles, hours and pay, political scandals, taxes. All such artificial creations of mankind might well be sunk without a trace, while nature, in all its wondrous ways, would continue to function as it always has. It is good to contemplate that your Society is devoted to the spread of an understanding appreciation of things that really count.

BIG NESTING SEASON IN TEXAS

At this season of the year there is great stir in the whole series of Audubon sanctuaries lining the Texas Coast, from the Vingt'un Islands in Galveston Bay to Green Island in the Laguna Madre near the Mexican border. Here avian reproduction is in full swing. Prospects are promising, and your wardens are on the job. "The birds came to the Vingt'un Islands rather early this year," writes Warden Friddell, and the young of the Ward's and night herons and American egrets will have left their nests by the time you read this. Though the name implies there are twenty-one islands, the seven or eight your Director has ever been able to find are now almost obscured by the great, busy concentrations of white, blue, black and pink birds building nests, sitting on their eggs, feeding their young, which fill the air with buzz and clamor. Simply every available spot in every cactus, in every huisache, in every salt cedar, and on the ground between, has been appropriated by the birds. Mingled with the nests containing the chalky blue eggs of the egrets and herons, and the big, whitish eggs of the spoonbills, are many of the beautiful, deep greenish-blue eggs of the white-faced glossy ibis. Even the wood ibis in small numbers has taken to nesting this year at the Vingt'un Islands, and Warden Friddell tells us that there are many more roseates than last year, and that they are "a beautiful sight." He adds, "the birds have not been disturbed—no visitors."

GREEN ISLAND NURSERY

For hundreds of miles the barrier islands, with their shell-strewn beaches

and inlets to the great bays or lagoons, extend southwestward from Galveston Bay to the Mexican border and beyond. Off the mouth of the Arroyo Colorado, not far from Harlingen, lies the tight little isle, bathed in sunlight and lashed by wind and storm, where your Society guards, through the devoted aid of Warden John Larson, the largest nesting colony of reddish egrets in this country. There on Green Island Warden Larson stays with an assistant from mid-March to mid-September of each year, depending upon rain water from the roof of his small cabin, and watching the welfare of the bird colony from the wooden tower and from the few trails that wind through the vegetative tangle in which the nests are legion. Snowy egrets nest here, too, in great numbers, and American egrets increasingly in recent years. On the beaches of this little island nest skimmers and terns, and seldom does a day pass without the presence of stately groups of white pelicans and roseate spoonbills which, however, have not yet deigned to select Green Island for nesting. From this reddish egret colony as a nucleus, this species has in the past decade spread northeastward along the Texas coast.

TEXAS IN MIGRATION TIME

As a spot to observe the peak of the spring migration of passerine birds, the Texas coast, in the experience of your Director, takes the cake. What could be more thrilling than witnessing, as of about the first of May each year, flocks—literally—of indigo and painted buntings, orioles and tanagers, hummingbirds and grosbeaks working their way northeastward from bush to bush amid hordes of warblers, and in the presence of great numbers of the spectacular resident scissor-tailed flycatchers. Warden Larson wrote in his report on April 20th, 'Many hummingbirds the last couple of days."

ITEM FROM TORTUGAS

Here's something interesting and apparently new about the habits of noddy and sooty terns. Custodian Budlong of the Fort Jefferson National Monument in the Dry Tortugas finds that, although the first daytime appearance and landing of these birds for nesting activities on the Islands was not witnessed until May 3, 1943, the birds were frequently heard flying over the Islands at night for many weeks prior thereto, and this year the first night flights were recorded on February 14, 1944, and the birds were heard each night thereafter without, at the time of his report this spring, any daytime evidence of the birds' presence.

RECORD-BREAKING TOURS

The Screen Tour program proceeds apace, with John Storer, Edna Maslowski, Sewall Pettingill and Alexander Sprunt doing their bit in bringing fine entertainment to audiences in the midwest. Bert Harwell, your Western Representative, is now on lecture tour in Oregon and Washington, following an active program in his home state of California. To Alexander Sprunt, however, goes the palm in having addressed since February no less than fifty audiences, including 36,870 persons. This brought his schedule up to April 23, after which date he had fourteen more lectures to deliver. He will, we think, have well earned a little rest in restful Charleston.

FOR CAMP COUNSELLORS

At the Audubon Nature Center in Greenwich, Connecticut, two courses have been offered to teachers and youth leaders this spring, and this work will continue to carry on through the summer, in four special sessions. If present plans carry, as we surely hope

Allan D. Cruickshank

Near the Arroyo Colorado, the largest reddish egret colony receives protection . . .

they will, groups of some thirty persons at a time will be enrolled in these special courses this summer from about the 10th of July until Labor day. . . . As it again seems wise to defer operations at the Audubon Nature Camp in Maine this summer, the contemplated program at the Center in Greenwich would conform in general character and scope with the instruction given at the Maine Camp through the seven seasons of 1936-42.

The Center has been actively used this year by many groups of young people, with definite appointments made for their conduct through the area by Richard Weaver, the Center's Educational Director. You will be pleased to learn that the Greenwich High School has, of its own initiative, asked whether it might send, in May, its five hundred or more children to the Center by bus, in lots of thirty or so at a time, to be taken afield under the guidance of Dr. Weaver. Surely, you will agree that such use of our sanctuary and educational Nature Center offers convincing evidence of the existing public demand for the kind of opportunities to observe nature under skilled leadership, the provision of which constitutes one of the major objectives in our program.

SCHOOL NATURE LEAGUE NEWS

As this school year draws to a close we are moved to mention the work of Mrs. Minna S. Blatt, our "visiting teacher," who for two years now has been assigned to the School Nature League of your Society by the Board of Education of the City of New York. Mrs. Blatt, herself an experienced classroom teacher of natural history, has during these two years visited hundreds of New York City schools, giving advice to principals and teachers with regard to the establishment of nature rooms, nature and conservation teaching activities, printed and visual aid materials. In one of the most urbanized communities of the country—New York City—she is demonstrating how natural history can be taught in a city school situation.

CALIFORNIA DUCKS

Increase in the wintering duck population in the Imperial Valley in California has brought in its train administrative difficulties, to say the least.

Crop damage in nearby agricultural areas was, it was claimed, substantial. There has been local comment, however, that much hullabaloo has been raised by "white" farmers who have replaced the Japanese who previously worked those fields and who seemed to take the damage by birds more as a matter of course.

The state refuge near Calpatria was opened to hunting, apparently without due legal authority, and it would appear that this was done primarily to please the shooters and, incidentally, to placate the farmers. Demands have been made that the state dispense with the refuge and sell out to a gun club.

At the nearby Salton Sea Refuge, maintained by the U. S. Fish and Wildlife Service, there seems also to have been pretty complete breakdown, no resident management having been stationed there for some two years, due, it is claimed, primarily to lack of funds.

Resident nesting birds on the islands in the Sea and about its southern margins have included a fine colony of white pelicans, American and snowy egrets, fulvous tree ducks, many white-faced glossy ibis, a growing group of gull-billed terns; whereas in fall and winter, many kinds of ducks and grebes abound, as do plovers, avocets, stilts, curlews, godwits, willets and other sandpipers.

The problems of the Fish and Wildlife Service are enhanced by the fact that the water level in the Sea has in recent years risen to such a degree that a large portion of the federal refuge is now under water.

Here, then, is a controversial situation which has already engendered a great deal of heat and caused widespread discussion, especially in southern California. It calls, it seems to us, for the most careful and calm consideration, in order that any justifiable complaints of crop damage by the

birds be given due weight and a solution of the problem sought, while at the same time the continuance of both state and federal refuges under competent administration be assured.

LIMELIGHT ON FOXES

Your Director never felt a deeper sense of disgust than when reading the article and viewing the pictures published in a recent issue of *Life* magazine about the driving and brutal beating to death of foxes in Ohio.

Every decent instinct that one has toward wildlife is shocked by those appalling pictures of grown men and women harassing foxes in that way, and standing around in a circle while a small child beats a fox to death.

Life advises that it has seldom, if ever, received as many letters from its readers as resulted from publication of this article and these pictures. The feeling of revulsion among the subscribers was extraordinarily widespread.

There have been claims, apparently with ample foundation, that the representations in *Life* were far from true to the facts and resulted from deliberate staging of the event to suit the photographer. Nevertheless, we all know that just such an attitude toward numerous kinds of wild animals does exist among people in many parts of this country, and that the public interest will be served through the publication of pictures portraying what does actually transpire in these days of the so-called civilized man.

Sportsmen may scarcely feel entirely free of blame for the development of prejudiced attitudes as, for reasons of their own, they have publicized the view that foxes and numerous other wild animals are, from their standpoint, "vermin."

While your Director deplores the method of killing portrayed in the pictures in *Life,* it is his feeling that progress will be better made through undermining the motive to kill, through the spread of truthful information, than warring over the relative humaneness of various methods of killing.

For the ducks in California's vast valleys . . . no haven?

Allan D. Cruickshank

Rest assured that your Society promptly acquainted the Commissioner of Conservation of the State of Ohio with the nature of our viewpoint in this matter.

NOMINATIONS IN ORDER

Each year your Board of Directors appoints an official Nominating Committee, to make recommendation at the Annual Meeting of members of a slate of five directors to serve for the ensuing three years, as well as additional directors in the event that there be instances of unexpired terms to be filled. Last year's committee has been reappointed, consisting of Mrs. Robert C. Wright, a former director, of Haverford, Pennsylvania, as Chairman and Mrs. O. M. Stultz of the Los Angeles Audubon Society and Mr. Walter Elwood of the Sassafras Bird Club of Amsterdam, New York, as the other members. The slate to be recommended by this committee will be published in the August issue of the magazine. Suggestions for nominations for members of the Board may be submitted to the Nominating Committee by any member of the Society.

THERE'S A GREAT DAY ACOMIN'

The Fortieth Annual Conference of your Society will, according to present plan, be held in New York City Saturday—Tuesday, October 14-17 next. Tentative arrangements involve on Saturday a special meeting of representatives of branch organizations, as well as one of teachers and others especially interested in the promotion of Audubon Junior Clubs and the School Nature League materials.

It will by then have been three years since an Audubon Nature Camp Reunion, and so, that Saturday evening, there is to be a get-together affair for all former campers and others interested in that activity of your Society; this will probably be referred to as Audubon Nature Camp Loyalty Night, and we very much hope that it will seem feasible to renew activities at the camp in Maine in the summer of 1945.

Those attending the Conference who may prefer to visit on Saturday the Audubon Nature Center in Greenwich or the Roosevelt Memorial Sanctuary on Long Island will find members of the staff present there to welcome them, but the regular day for such visits will be listed as Sunday, the 15th. Consideration of extensive field trips such as were formerly taken to Montauk Point and Cape May continue to be out of the question for the duration.

On Monday, the 16th, there is to be a special meeting of representatives of affiliated clubs, and a motion picture program afternoon and evening, with discussion of conservation topics. The lecturers who participate in our Audubon Wildlife Screen Tours will be featured, so that in addition to the attractions of the other events, those who attend may have the pleasure of enjoying within the short space of 48 hours a whole series of Screen Tour lectures.

On Tuesday, the 17th, the annual members' meeting will be held at Audubon House in the morning, as well as a meeting of the Board of Directors. The motion picture program and discussion of conservation topics will continue on Tuesday afternoon, and in the evening there will be held the Annual Dinner of the Society at the Roosevelt Hotel. Programs with full particulars should be mailed to all members in September. It is hoped that all readers within reasonable distance of New York City will wish to put these dates on their calendars now and plan to be with us at the Fortieth Annual Conference.

The Changing Seasons

By Ludlow Griscom

THE period covered by this report is always difficult to summarize, because it is spring in many of the southern states, it is part winter, part early spring in other sections. Some day I hope it will be possible to work out a schedule by which these articles will be reduced to four, one for each of the quarters of the ornithological year.

The dying pangs of winter would appear to have had but little effect on the bird life in many parts of the country. In southern California heavy snow in the mountains brought flocks of robins and waxwings to the lowlands. In the northern states generally, February was mild with little snow or rain in parts of the northeast. There was a pronounced warm spell late in the month, which started the spring migration, only to have wintry conditions return in early March. Very different weather prevailed in Utah, where February was cold, and March stormy with a blizzard in the middle of the month.

The great flight of evening grosbeaks continued unabated and the bird became common around Philadelphia and reached Virginia (Dr. J. J. Murray *in litt.*). The other event was the development of a great invasion of redpolls into the northeast though only stragglers reached Philadelphia. Peak numbers were not reached until mid-March, by which time some flocks of a thousand or more individuals roamed the countryside. With them came the rare northern redpolls, the little known hoary and the greater from southern Greenland, as far south as eastern Massachusetts. The latter, a critical subspecies, was not collected and identifications might well be questioned. No one can reasonably claim any such doubt for the pale adult hoaries, however, which positively gleam in sunlight. This year there were often several individuals in large mixed flocks, and the total number of birds exceeded the records for the past fifty years combined.

The warm spell in late February caused an early beginning of the spring migration in most of the northern states. Most of the birds involved disappeared during ten days of winter in March, and the migration of many less hardy land birds began all over again the middle of the month. Indeed the solution of this mystery is a far more important field problem than the mere chronicling of the migration. Early geese and ducks can usually be located; they "stay put" during the cold spell, and most of the individuals survive. But what becomes of the land birds? Do they perish? Do they gather in some favorable spot, which escapes observation? Mostly we cannot answer these questions except by suppositions.

Apparent contradictions in reports are also of interest; these sometimes merely reflect the accidents of faulty observation, but again they may point to real life-history problems awaiting solution, ignorance and incomplete coverage being clearly indicated. For years I have been interested in the spring migration of the fox sparrow, because reports from adjacent areas never agree. This year there was a great flight from Philadelphia to southern Connecticut, it was common in western Massachusetts, but particularly scarce in eastern Massachusetts.

Another case this spring is furnished by the ring-neck. For two years it has been slowly but steadily decreasing as a transient in eastern Massachusetts. The spring flight just passed continued this trend, so I was not prepared to read of great numbers near Philadelphia, up to 1000 birds in a flock.

I regret to point out that a decrease of the wood duck is noted from Philadelphia to New England. More goshawks than usual in the northeast. Cardinals and mockingbirds are steadily pushing northward in the same area, but the cardinal is much the slower and has gained but little territory.

In the far south, spring was early with very heavy rains in March. The birds, however, did

not follow the early development of the vegetation on the whole, though it must be admitted that certain species wintering in tropical America arrived very early.

An outstanding event was a flight of Mississippi kites at Rockport, Texas, on March 22; there were 300 in sight at one time.

There are at least two European black-headed gulls in the United States, as one wintered on Long Island, and another at Newburyport, Massachusetts. A little gull wintered on Long Island, also; the same, or possibly another, individual appeared in Massachusetts northbound on March 26. A varied thrush in Minnesota, a plumbeous gnatcatcher in eastern Texas, and a Harris' sparrow in Utah are stragglers of exceptional note.

NATURE STUDY

A group is being organized for the study of natural history, especially birds, under the leadership of Chas. H. Rogers, well-known ornithologist and Curator of Princeton Museum of Zoölogy.

A veritable paradise for nature lovers, Elk Lake is located in the heart of thousands of acres of wild, unspoiled forest land, abounding with native plants, birds and other wildlife.

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NOTICE TO ALL THOSE RECEIVING THE REGULAR EDITION IN TWO SECTIONS

Due to increased costs of paper, printing and distribution, we find it necessary to put this Edition (containing five Season Reports, a Breeding Bird Census and a Christmas Count) on a self-supporting basis, and will, therefore, make an additional charge of $1. per year for them. In accordance, however, with our commitments, we shall continue to send them without extra charge, until the dates of renewal of membership or subscription, to those who have already requested that the supplements be sent to them.

Members, when renewing membership in future, will need to include an extra dollar if they wish to receive this Edition. Subscribers, as distinct from members, may renew subscriptions in future for the National edition of the magazine (without the 2nd Section) for $2. per annum ($2.25 foreign), or for the regular edition (with the 2nd Section) for $3. per annum ($3.25 foreign).

Individual copies of the Season Report 2nd Section may be purchased at 15¢ each; of the Breeding Bird Census Section at 25¢; of the Christmas Count Section at 40¢. Our supply of past issues of the Breeding Bird Census and Christmas Count Sections has been entirely exhausted.

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FROM YOU TO 99

hospitals and camp libraries—*and that means to hundreds of sick and wounded American boys—AUDUBON MAGAZINE has brought the outdoors and release from thoughts of war. You and A.M. are doing a morale war job, and more than that, for in A.M.'s pages is a new and vital conception—conservation! Every magazine going to the boys makes us feel warm inside. It must make you feel that way too.*

To the list of gifts, *this month we add a subscription from the boys and girls in the 6th grade of the Dover Street School, Milwaukee, Wis.; and another from their teacher, Mrs. F. C. Juneau. From the Junior Audubon Club of the Clinton School, Columbus, Ohio, and its sponsoring teacher, Mrs. Myrtle Grady, go four gift subscriptions to base and hospital libraries.*

The Ridgewood Audubon Society of N. J. sends five gift subscriptions to Veterans', Station and Service Club libraries; two gifts, each, go from the Los Angeles Audubon Society, Mrs. R. D. Willison, Cincinnati, Ohio, Francis S. Dobson, Rockford, Ill., and C. Waldemar Christiansen, Altadena, Calif.; and one, each, from Theresa Patterson and Anne Walden of Pasadena, Calif.; Mrs. William Wernowsky of Duluth, Minn.; Mrs. Arthur S. Putnam of Manistique, Mich., and from the Twentieth Century Club of Hattiesburg, Miss.

LET US SEND A GIFT FROM YOU

Audubon Magazine's Breeding-Bird Census

Reports due August 1

ON their many Christmas Bird Counts, readers of *Audubon Magazine* have generally attempted to cover those areas containing the widest number of habitats yielding the richest and largest possible single day's list of birds in a 15-mile circle. The Breeding-Bird Census is cut from a radically different pattern. In it, bird clubs and bird watchers take careful counts of breeding birds in the interesting habitats of their local regions. Many facts have already been accumulated on how the population densities vary but, so far, most censuses still pose problems whose answers are not yet available. Solutions to some of these will eventually make a substantial contribution to ornithology and conservation.

SELECTION OF AREA

Habitats typical of large regions are particularly wanted. They should be easily recognized, preferably simple, and, above all, clearly described. *No special merit lies in the reports of unusually high densities or of very rare birds.*

At least one-half the value of each count will lie in the care with which the study tract is chosen. Because few censuses that show annual fluctuations, not directly caused by plant succession or by changes due to man, have ever been taken, habitats that are mature and therefore stable are most desired. Censuses from bogs, original prairie, virgin timber, and other rare, primitive types are of special interest. Because farms, orchards and bird sanctuaries were censused for so many years for the U. S. Fish and Wildlife Service, *Audubon Magazine* is somewhat reluctant to include reports of these complex types.

The study area should, so far as possible, be restricted to a single uniform environmental type. Censuses should be taken on contiguous tracts of preferably not less than 15 acres or more than 100 acres in size. Observers desiring to census rare habitats of less than 15 acres should consult the census editor before initiating such field work.

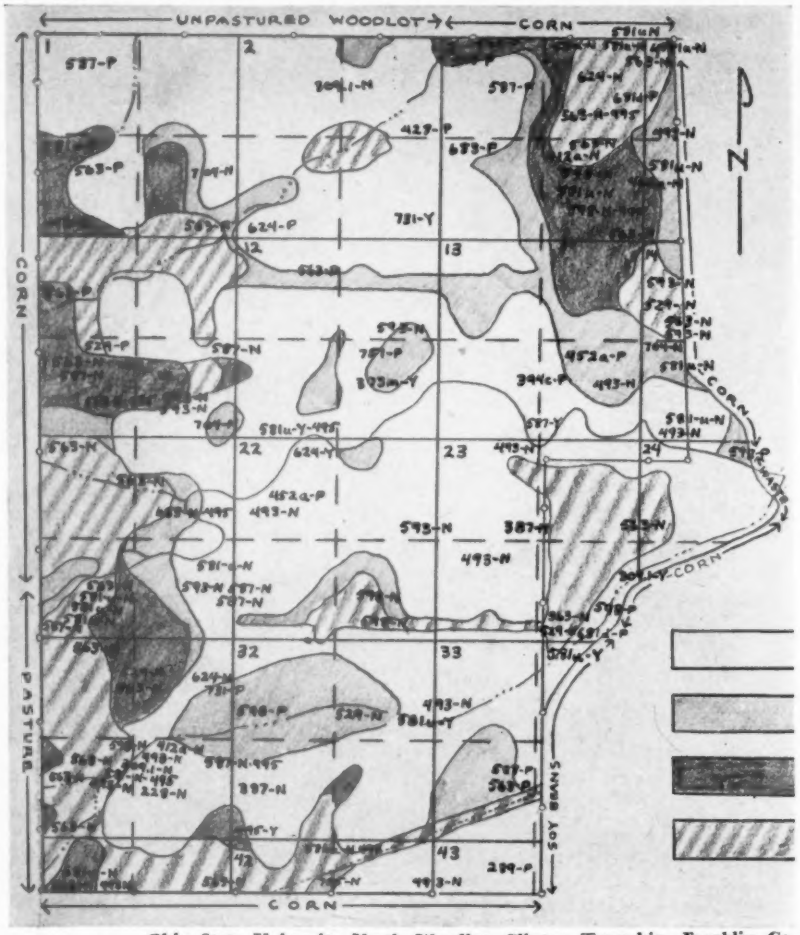
Decisions as to the best size can be based on: (1) the extent of uniform habitat available; (2) the man-power and time obtainable for observation; (3) the observational difficulties presented by the density of cover. Twenty-five acres of heavy forest are quite as much as the average beginner can census alone on week-ends throughout the season.

Counts ought to be made where they may be repeated annually and, except in highly inaccessible regions, observers are requested not to take censuses unless they feel it is likely that they may continue to repeat them.

MANNER OF COUNTING

During the breeding season the bird population of any given habitat may be said to include five roughly divided classes: (1) birds nesting and residing entirely within the area; (2) unmated birds defending territories inside the tract; (3) birds nesting in the area and feeding outside of it; (4) birds nesting outside the area but visiting it for food or water; (5) wandering birds that have not yet nested or may already have done so. Although these classes intergrade with one another, the ideal portrait of an avian community would seek to separate them. Such an ideal can scarcely be achieved in the limited time many enumerators have in the field. This is especially true regarding Group 2, and observers finding singing males continuously occupying fixed territories may report these as pairs along with those birds seen carrying nesting material or food, or whose nests are found.

Counts should be conducted by marking each bird seen on a map of the study area. The simplest method is to lay out north-south and east-west lines 150 or 208 feet apart which will create a grid subdividing the area into ½ or 1 acre units. These are easily run any time before the leaves come out using a compass and rope or simply by pacing. Colored stakes, pieces of cloth or paint on trees can be used to mark the lines and their intersections. Great accuracy is not needed and the above method is quick and easy and entirely satisfactory. By using one map for each species, the breeding population can then be readily broken down into pairs on territories, visiting birds, Groups 1 and 2, 3, 4, and 5. Mapping territories is extremely useful where "island effects" occur and where it is necessary to learn the extent to which some species nesting inside the tract actually feed outside it. In long, narrow tracts this method is of even greater importance in postulating accurate densities. For the more extensively ranging birds (crows, jays, woodpeckers), it is best to find the actual nests as early in the season as possible when the lack of foliage is an aid to discovery.



Ohio State University North Woodlot, Clinton Township, Franklin Co., Ohio

TIME OF THE CENSUS

The dates on which counts are to be taken obviously vary according to geography. In New Jersey, for instance, eggs of the great horned owl might be found hatching in February and those of goldfinches in September. Accuracy and thoroughness thus lie completely in the discretion of the enumerator.

At least five different counts should be taken. Although the most productive days will be those when the majority of birds are building their nests or feeding young that have not yet flown, the nature of the time spent afield is as important as the number of days the area is visited. Cruises over a tract after 7 a.m. will, in some habitats, show but a 50 to 75 per cent efficiency in recording certain species. Where necessary, two night visits should be made to check for owls, woodcock and whip-poor-wills.

REPORTS

The model census that follows is a purely synthetic one that has been designed to include the more important data on factors perceptibly influencing the character and density of bird populations. *Each census-taker should follow the form closely,* report all birds present in their A.O.U. order, and, wherever possible, endeavor to give the same kind of information. Many helpful suggestions for preparing reports will be found through study of the censuses of previous years (*see* the September-October issues of *Audubon Magazine* since 1937). Incorporated in each new census should be the scien-

tific names of the predominant plants within the area, together with the name of the authority used as a source.

Cowbirds are to be counted as part of the breeding population, their density being reported on the basis of the average number of individual males and females observed using the area regularly during the breeding season. Accuracy here is more important than length.

All censuses should follow the same use of symbols: P = pair; M = male, generally singing on fixed territory and continuously observed throughout the season; N = nest; Y = a pair seen feeding young; UM = unmated male. These symbols should be used to represent the classified basis for the number of pairs of each species. Parentheses may be used to indicate subtotals. Thus: "fish crow, 2P, 4N, 4Y" = 10 pairs; "robin, 2P (4N), 4Y" = 6 pairs of robins, 2 of which had second nests.

Reports should be typed, if possible, double-spaced, and on one side of the paper only. Submit reports as a single paragraph; it is hoped to print censuses in tabular form at five-year intervals to show cumulative totals, but such deviations now must depend on the discretion of the census editor and the amount of space available for the reports in a given year.

WEATHER

Generalities are wanted on the weather of the breeding season studied, as well as on the preceding spring and winter. Such information can often be obtained from the nearest U. S. Weather Bureau. If the site of this station is not meteorologically comparable to the study area, further inquiry from the Weather Bureau may disclose the existence of obscure nearby recording stations cooperating with the government.

MAPS

Each census should be accompanied by one or more maps, 10x8 inches, in black ink showing boundaries of the study area, adjoining environment, scale, nests, centers of territories occupied by pairs or singing males, vegetational blocks, direction of north, and enough landmarks so that the tract may be readily found by some other person wishing to census it in the future. Special numbers should be used for each species of bird on the map, symbols (P, N, Y, etc.) being added to each number. Census-takers are urged to include photographs illustrating their study tracts; where space permits some of these will be reproduced in *Audubon Magazine*.

UPLAND OAK-HICKORY FOREST. Forest crown somewhat open with a substratum of shrubs averaging 8 feet in height and covering 40 per cent of the tract; typical woodland of southern Illinois; trees average about 70 feet in height and about 1 foot DBH (diameter breast high); 70 per cent oak, 30 per cent beech; about 2 dead trees per acre; no interference by man for at least 35 years; once used as a cornfield. **Size:** About 25 acres (400x300 yards, paced). **Location:** Naghuna, Ill. Tract bounded on all sides by similar forest, except for 45 yards of pasture. **Topography:** Steep, rolling hills, elevation 150 to 200 feet; numerous outcrops; 2 running brooks. **Edge:** Provided by 45 yards of adjacent pasture; this attracted 3 pairs of birds. **Surveys:** Infrequent trips for 2 years; mapping completed April 9, 1944. **Coverage:** April 16, 23; May 8, 15, 22; June 4, 11, 18; July 10, 31. Hours varied from 5:30 a.m. to 10 p.m., and totaled 53. **Weather:** Normal throughout period; winter previous open and unusually warm; temperature in 1943 breeding season about average, but precipitation very heavy in June. **Census:** Red-bellied woodpecker, 2P; wood pewee, 1Y; blue jay, 1N; summer tanager, 2N, 2Y. **Total:** 4 species, 8 pairs. **Density:** 32 pairs per 100 acres (31 pairs in 1943). Feeding outside tract: Turkey vulture, 1N; whip-poor-will, 1Y. **Final density:** 40 pairs per 100 acres. Frequent visitors: Cooper's hawk, 1M; fish crow, 1P; tufted titmouse, 1P; bluebird, 1P.

EDGE

The edge effect represents that boundary or part of an area that permits the simultaneous access of a bird or other animal to two or more types of environment. It may occur inside the study tract or on its boundaries. Observers should be careful not to confuse these ecological boundaries with the physical boundaries.

Many species appear to prefer to lay out their territories in such a manner as to include more than one environmental type—hence the high densities reported from orchards, bird sanctuaries and the like. Observers who report on two habitats should measure the acreage of each and determine the length of edge between them. In some cases the edge effect may be calculated by determining the respective densities of smaller samples of the two habitats. If these examples are not too close to the complex intervegetational zone in question, their densities will afford interesting comparison with the density found for the entire study area.

SUPPLEMENTARY INFORMATION

Because of the great lack of information on the subject, all census contributors are urged to give facts, under the heading of "Remarks" in their report, on territory, size and the foraging range of the species on their study areas.

BIBLIOGRAPHY

(1) For A.O.U. order, consult any of the more recent handbooks, or the Audubon field cards; (2) for examples of thorough census work—A. A. Saunders *Ecology of the Birds of Quaker Run Valley* (N. Y. State Museum, Albany, N. Y., 50 cents), and A. B. Williams' *Composition and Dynamics of a Beech-Maple Climax Community* (Cleveland Mus. Nat. Hist., 50 cents); (3) for a classification of habitats—V. E. Shelford's *Naturalist's Guide to the Americas* (Williams & Wilkins); (4) how to plot birds on study maps—J. J. Hickey's *A Guide to Bird Watching* (Oxford University Press, N. Y., $3.50).

Letters

SIRS:

Lt. George H. Cox reports a banded pelican found on a Galveston dock, April 2, 1944, in good condition and very tame. Letters and numbers as follows: LFAMDRO USA AMDRADO 18008795.

I referred this inquiry to F. C. Lincoln, in charge of Migratory Bird Investigations, but he is unable to identify it. If any of your readers can furnish information, please ask them to communicate with me.

ROY BEDICHEK
Director, Division of Extension
University of Texas

Box H, University Station
Austin, Texas

AUDUBON
Living Memorials

THERE are few normal human beings who have not on occasion dreamed of a memorial which they would like to leave to posterity . . . sometimes in their own names, but more often to keep alive and to share with others the memory of a member of the family circle or of a friend.

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I hereby give, devise and bequeath to the NATIONAL AUDUBON SOCIETY, in the City of New York, in the State of New York,

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(or otherwise describe the gift), to be used for the general purposes of said Society.

SIRS:

Dr. Murphy's clear and timely article in the March-April issue contains food for thought for people in all nations, in all walks of life—and it is expressed in the beautiful Murphy style. Congratulations!

L. L. SNYDER
Royal Ontario Museum of Zoology

Toronto, Ontario

• •

SIRS:

Audubon Magazine is tops of all the really wonderful magazines I receive and your March-April issue is an all-time high! I would give first place to Sprunt's "Strange Wilderness," perhaps because so many times and under such happy circumstances I have wandered about the Everglades. Dr. Bennett's article is a close second. What a perfectly magnificent man he is, and when the annals of our country are written up, he will rank high among the number one heroes. . . . The articles called "The Director Reports to You" are so wonderful. We all feel that he is personally reporting to us, as though every one of OUR precious refuges belonged strictly to us, as though we were personally responsible for every great white heron or roseate spoonbill!

MARGARET M. CARY

Philadelphia, Pa.

• •

Dear Sirs:

Just received your note and am glad to know you are interested in the birds I am seeing "somewhere in England."

The number of species here is far below the average for any similar locality in the States. But there is definite quality in what is at hand. First impressions dwell on the countryside. Instead of our usual farms and extensive woodlots, tall trees, huge rivers and dense thickets, the areas here all seem cultivated. From a high point you can look for miles around and see a crazy quilt pattern of fields, each bordered by a hedgerow. Roads and highways twist and turn crazily—are hardly ever straight; and each one is bordered by the ubiquitous hedge. Many of the cottages are still thatched with wheat straw —or corn as they call grain over here.

The first startling bird is the blackbird. It is like our own robin—maybe a bit more shy—but instead of the gray back and richly colored breast, the bird is a very dark brown almost black, but has the bright yellow bill of its American cousin. Their real robin here, the British redbreast, is a small bird, hardly larger than our bluebird, with a brown back and a rich orange colored breast. Singing along the hedgerows it seems quite fearless and pugnacious. The pied wagtail is a striking bird found around old homes. Just like our pipit but in-

stead of being dull colored, is adorned in a motley array of black and white. If I see a sharp-shinned hawk, it is a sparrow hawk and a sparrow hawk is a kestrel, while a pigeon hawk becomes a merlin.

There are many thrushes. Mistle and song thrushes are like our typical brown thrushes. In the fall, from Scotland, come two visitors, the red-wing which is a brown thrush with a light stripe over the eye and the color of our robin's breast on its flanks, and the wild, slim fieldfare, is a brown thrush with a rich gray patch on head and back. Then there are other smaller forms as the redstart (a thrush), black redstart, whinchet, stonechat, wheatear and the familiar nightingale. For oddity there is the Irish dipper possessing all the same characteristics of our own gray bird, but this counterpart is a rich brown and sports a snowy white throat and breast.

The paridae, or titmice, as they call them—chickadees to us—are very colorful, such as the blue titmouse with primrose-yellow on its underparts, grayish-blue and green above, and the head blue and white.

The kingfisher is really tiny with an intense blue color on its back.

To tell the truth from my heart though, I long to hear the cardinal call from the honeysuckle, to hear bluebirds flying high in spring migration and to see our hosts of warblers coming through.

BUD REIMANN

Somewhere in England

• •

SIRS:

I am now ten years old and have subscribed to your magazine for two years. One article that I thought was of great interest was "Hummingbird Episode" in the December 1943 issue.

JERRY L. NARNOCK

Portland, Oregon

• •

SIRS:

Spring birds are coming thick and fast now. Found a prairie horned lark's nest on our drill field at camp last week. We routed the regimental parade so as to avoid the nest.

ROGER TORY PETERSON

Alexandria, Virginia

AT AUDUBON HOUSE

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